September 1974

Smithsonian

Remaining Shakers (p.40)
observe 200th year;
Sister Mildred, 77,
plays and sings 'Progress'

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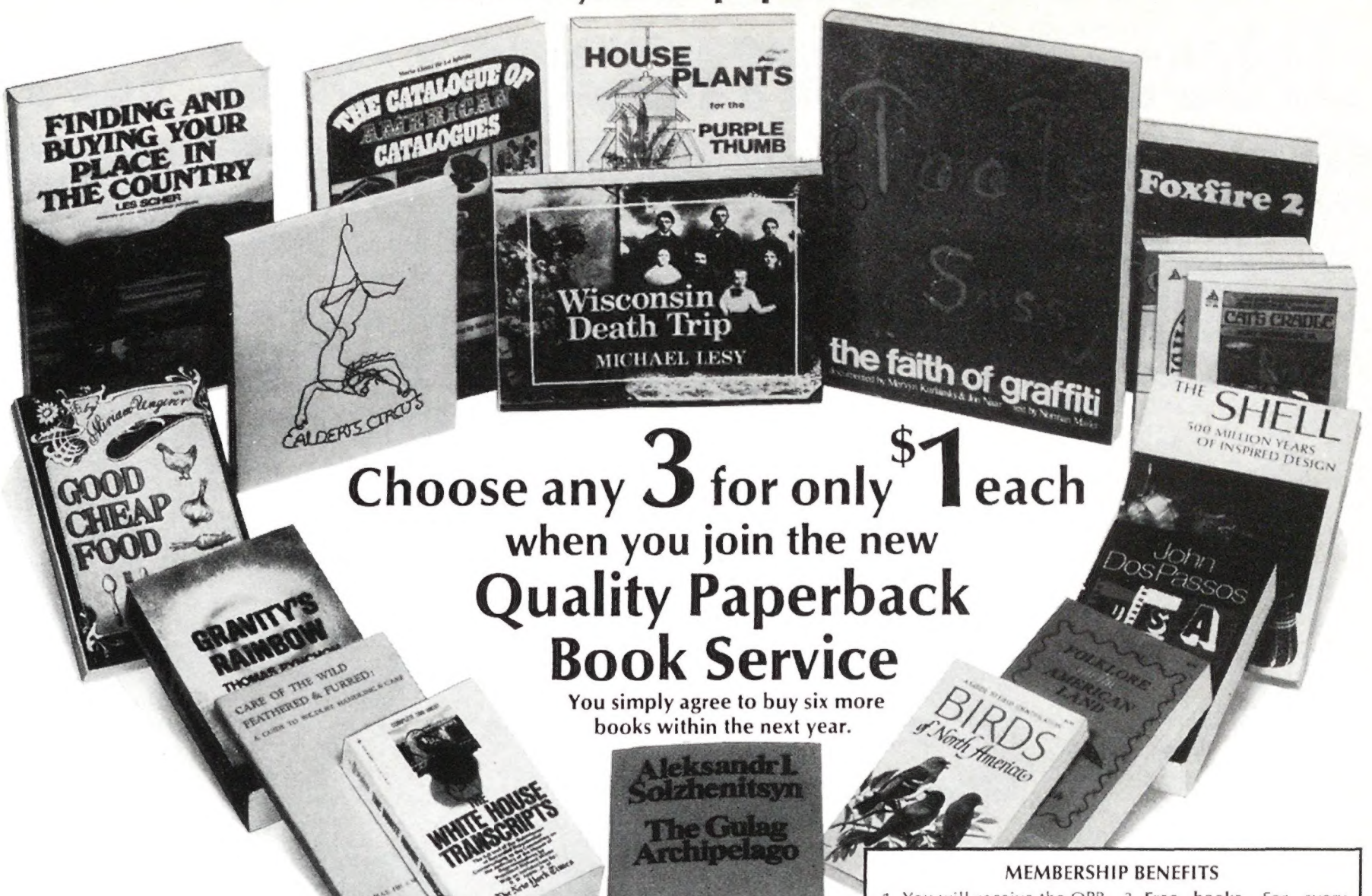

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September 1974

Smithsonian

Volume 5, Number 6

Table of Contents

COVER: Remaining Shakers observe 200th year; Sister Mildred, 77, plays and sings "Progress" Photograph by Alfred Eisenstaedt

4 The view from the castle: Secretary Ripley discusses problem of conserving wildlife in an interdependent world

6 Phenomena, comment and notes: some fishy math, stamping out baldness, zoning laws versus the otter, and early man in Pittsburgh

16 Letters to the Editor

24 A Bicentennial reminder of 200 years ago: John Adams writes of "Flummery" and "Syllabubbs" at the momentous first congress

30 Mighty Jupiter may be a star that didn't make it, one of many insights Pioneer 10 gave us
By Henry T. Simmons, paintings by Ron Miller

40 The remaining Shakers, now down to 12, mark 200th anniversary of their American beginnings
By Richard L. Williams
Photographs by Alfred Eisenstaedt

52 The coronation of a young king reflects the colorful history of Bhutan in ancient days
Photographs by Ernst Haas

64 The world's largest sea turtles remain a reptilian mystery, distinct from all other species
Text and photographs by J. S. Bainbridge jr. and Peter C. H. Pritchard

74 Alas, poor George, where is your head? The king's image was hacked apart and some of it is still missing
By Ralph K. Andrist

78 The anachronistic sport of hunting is big in Ireland, where affluent crowd chases the fox—or something
Photographs by Don Carl Steffen

84 You can't judge us by what we wear—a Smithsonian exhibition shows the democratization of dress

88 In East Africa, poaching worsens but is only a minor factor in the decline of wildlife
Text and photographs by Marion Kaplan

94 The ultimate private library is in London and has long been cherished by England's great authors
By Timothy Green, photographs by Farrell Grehan

100 Book Reviews

111 September events at the Smithsonian

114 Smithsonian tours

116 What's good at sea is bad in space
By Patrick Ryan

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GENERAL ELECTRIC

The view from the castle

Ecologists have begun to realize that it may be too much to ask 'have-not' nations to save wildlife as Man's common heritage

The Smithsonian Institution joined with the World Wildlife Fund (American branch) recently in a brief conference sponsored by the Ford Foundation. A number of well-known U.S. ecologists discussed what an organization such as the World Wildlife Fund, dedicated to conservation of endangered species and their habitats, can do in our newly recognized interdependent world. Endangered species are disappearing at an accelerating rate: Perhaps a million more of our planet's evolved forms of life will become extinct before the century is out.

For too long we have thought that conservation was merely akin to religious fervor, valid as that may be. But in our materialistic society, conservation, like religion, lacks clout. As the Yale biologist Evelyn Hutchinson pointed out, eroding the diversity of species (and their habitats) is economically prodigal. It closes off Man's options and it removes tools a scientist needs to serve humanity.

If endangered species and their habitats, like the air we breathe and the water we drink, can be thought of as common resources of mankind, then they, too, can serve to illuminate other dimensions of the complexities of common property resources. Perhaps they are not as controversial as oil or mercury, but still they represent the conflict between personal advantage and community loss—the difference, for example, between exploitation and conservation of ocean ecosystems.

In all of this there is an enormous gap between the "have" and the "have-not" nations. Most of the ardent conservationists are in the "have" nations and are therefore suspect to the rest of the world. Is this concern with the environment a kind of neoimperialism? Do the "haves" really care? It is far more complex to reason that the rare species and habitats of the world are international common property like the seabed, part of the patrimony of mankind owned by the community of the world. Like owners of a growth stock, we should be wise to the future, aware of the past and distrust those who would say "grab ye a profit while ye may." Those who would harvest the whales in rational Keynesian terms are not necessarily going to win the resource sweepstakes. But there is at present no code of laws protecting the heritage of society.

As Norman Myers, a brilliant young ecologist, says: "A further complexity lies in the socioeconomic divergence and cultural dissonance between the advanced world, where most wildlife conservationists live, and the emergent world, where many endangered species exist. Those Third World countries which are trying to safeguard species under threat are scarcely in a position to subsidize the rest of the world. Conservation on an international scale entails an implicit transfer of a nation's perceived wealth."

Perhaps what Myers and the scientists at the World Wildlife Fund meeting are driving at is a way to attack the problem of world stability and peace. Endangered species are an urgent problem, but at the same time less prone to create wars than oil or plutonium. A willingness to concede sovereignty and codify international property rights in the name of species heritage might promote a sense of dignity and standing in the Third World, and remind us as "haves" of our obligations.

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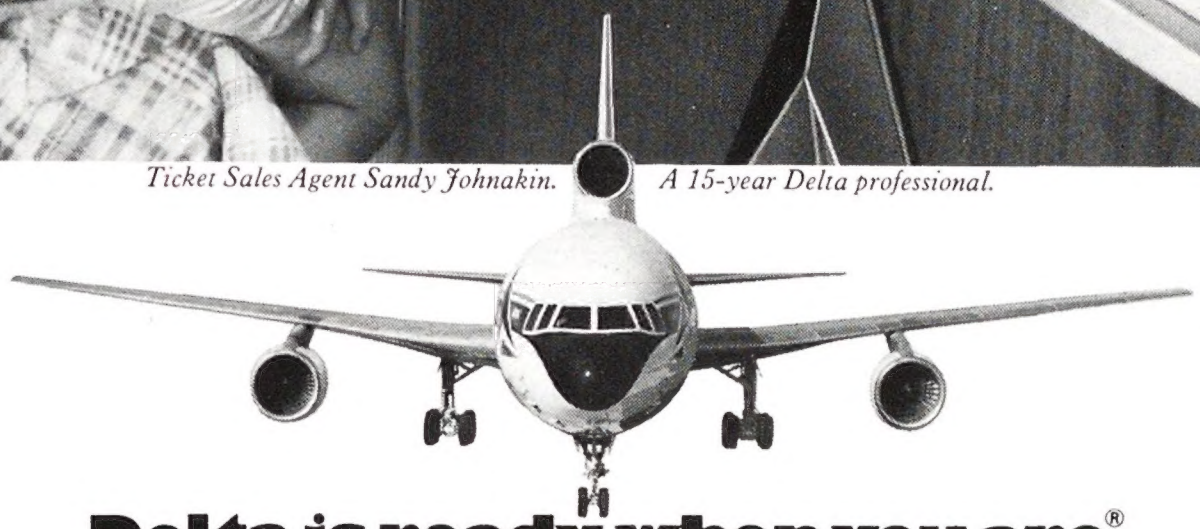

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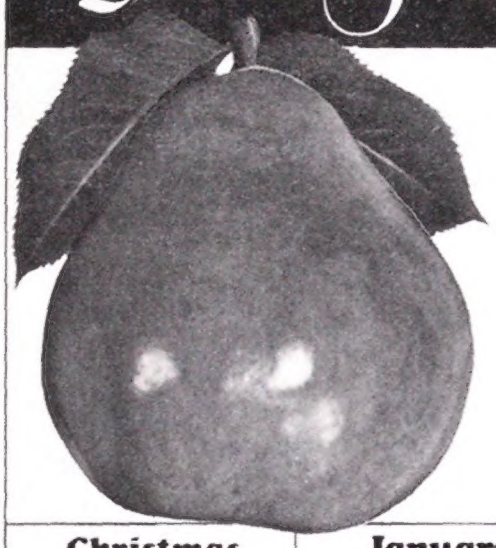

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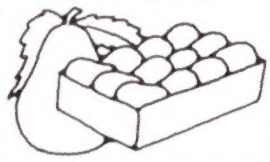

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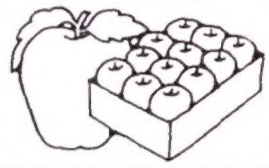

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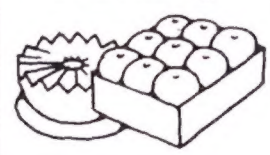

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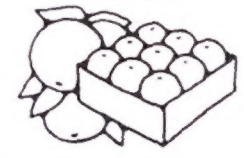

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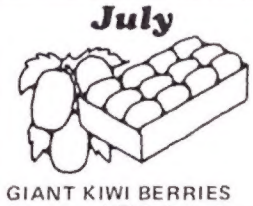

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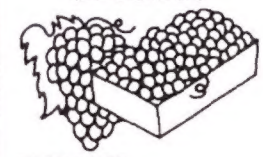

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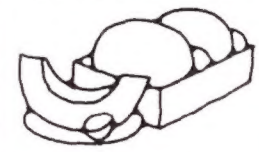

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Phenomena, comment and notes

Fishy mathematics, stamping out baldness, zoning laws versus otters and early man in Pittsburgh

With the Pirates looking sluggish in the National League East, Pittsburgh fans can turn to archaeology for a winner. A team from the University of Pittsburgh has collected a couple of firsts and run off with the pennant in the North American Habitation League, Eastern Division.

In a large overhanging rockshelter some 30 miles from the city, Pitt scientists, led by Dr. James Adovasio, unearthed artifacts and other signs of human habitation dating from about 12,000-13,000 B.C., the earliest human material in the East.

Among the most interesting artifacts: two "prismatic blade tools," the first sign of blade tool culture anywhere on the continent (12,000-13,000 B.C.); some of the earliest domesticated beans in the East (dating from 300-800 B.C.); some very early ceramics (about 1100 B.C.); and a burned bark basket, one of the earliest perishable artifacts ever found in the East (about 2000 B.C.).

This sensational season for the Pitt team actually took place in 1973. Dating of these and thousands of other objects took almost a year at the Smithsonian's radiocarbon dating laboratory. When it comes right down to it, archaeology is an even slower game than baseball.

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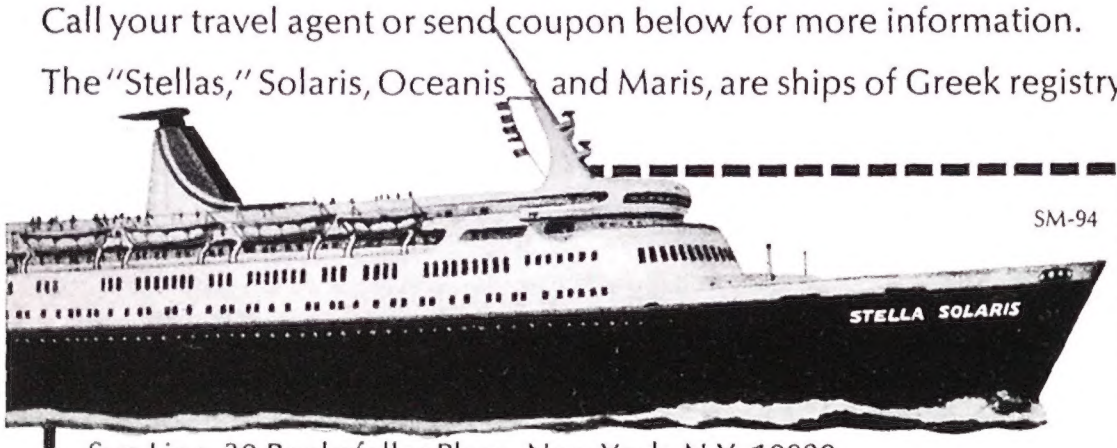

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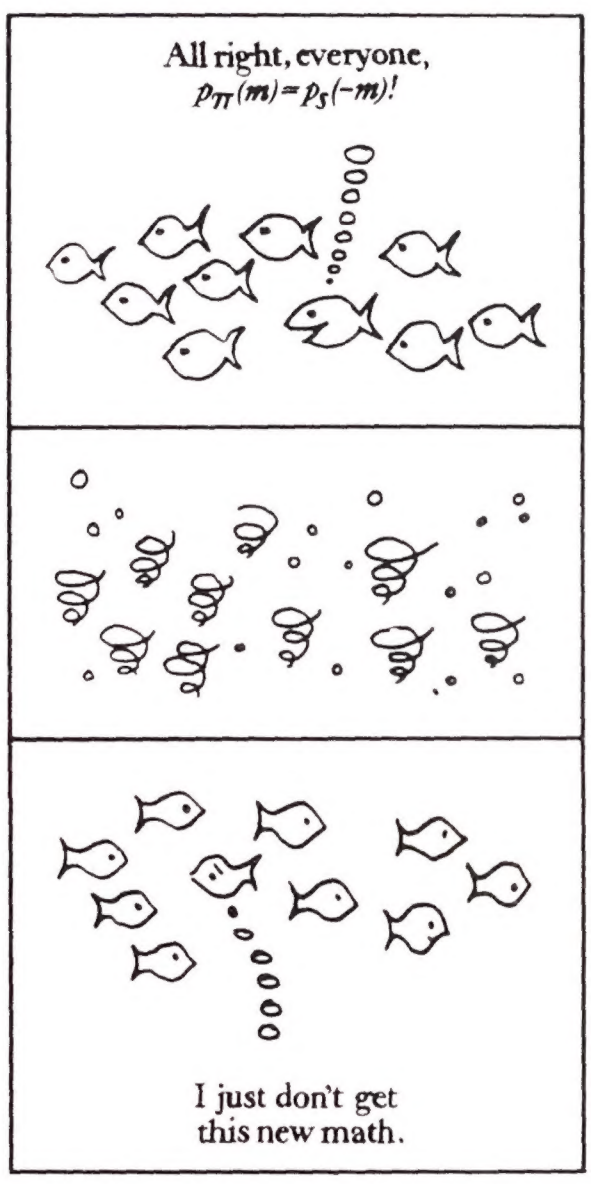
equations incomprehensible to any but the science's practitioners. Then it follows that physics is an adult while sociology and psychology are squalling brats. Biology is somewhere in between, but as more and more physicists transfer (seeking a lost youth, perhaps), the science of life is lurching into adulthood.

Lately two physicists from Washington, D.C., Earl Callen and Don Shapero, grew curious about such natural phenomena as the schooling of fish, the synchronous flashing of certain Asian fireflies and even the tendency of people to follow fashion. These instances of "social imitation" reminded them of magnetism. "But how," they asked in *Physics Today*, "does one make such an attractive analogy quantitative?" Through quantum electronics theory, they answered. And the result is that when, say, a school of fish turns from north to south, it is proceeding through an elaborate mathematical construct that includes such maneuvers as

$$p_{\mathfrak{N}}(m) = p_{\mathfrak{S}}(-m)$$



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But would conservation also mean a cut in production which might lead to further unemployment?

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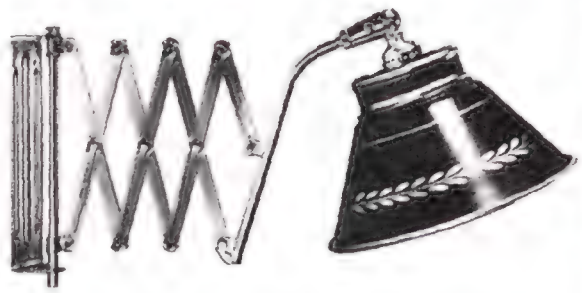

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men and probably most biologists will be relieved to know that the authors later state: "We should not take the mathematics too seriously. . . ."

A vote against otters

In addition to his successful Pheasant Trust in Norfolk, England (SMITHSONIAN, June), an enterprising naturalist named Phillip Wayre is seeking to establish another trust to breed, as he does with pheasants, endangered species of freshwater otters. Now who could be against that?

The Dedham Vale Society is against it, according to *New Scientist*. And so the planning committee of the Suffolk County Council (Dedham Vale being an area of "outstanding natural beauty" in Suffolk) has turned down the idea of serving as home for the Otter Trust. It's not that anyone in Suffolk has anything particular against otters; it's that the citizens fear "the otters might attract vulgar sightseers" to the Vale.

Good news for skinheads

One million Americans, according to *Medical World News*, have had hair transplanted from one part of their body to another in the past 20 years. Assuming that most of these persons are men and that the ultimate target has most frequently been the pate, the question can now be considered settled as to which sex is the more vain.

The operation is adjudged to be nearly 100 percent effective if performed by a trained surgeon. So straightforward is it that one physician did it to himself, his only difficulty being that, unable to see his own scalp directly, he put in the hair plugs askew and now his new hair grows in a different direction from the old.

Meanwhile, the founder of this procedure, Dr. Norman Orentreich of New York City, believes that he is on the verge of solving the problem by medication rather than surgery. The key is that a given follicle of hair, depending on where it is found on the body, is genetically programmed to continue growing or to stop growing in the presence of hormones called androgens. Beard hair is stimulated by androgens; scalp hair inhibited.

This is all good news, but it does spotlight the slightly silly human propensity to stonewall nature: A man may spend up

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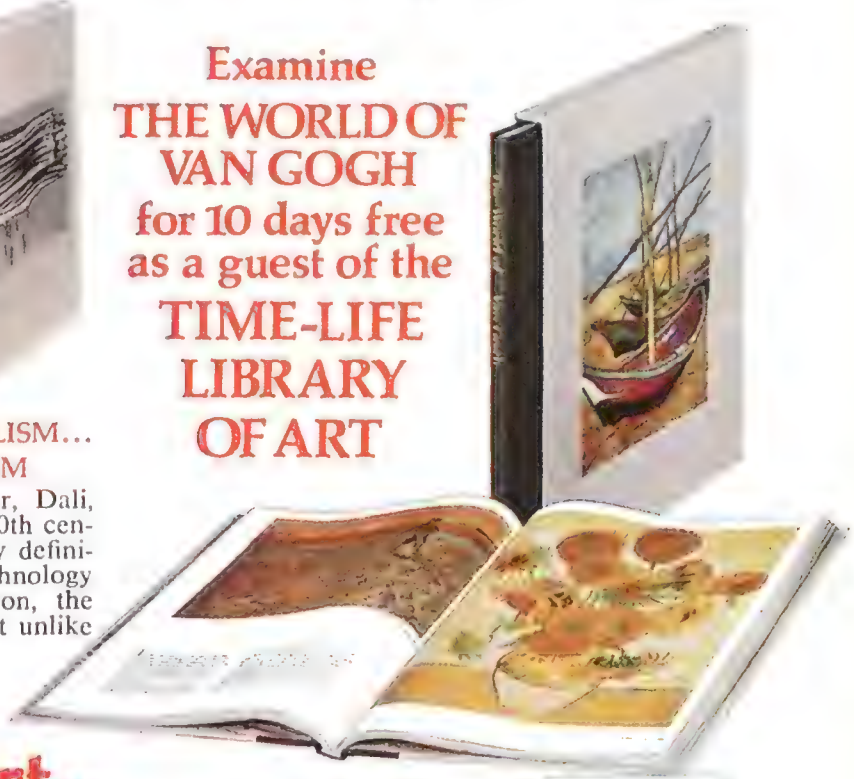

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WINE TALK

by Austin, Nichols

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to 3,000 hours of his life removing hair from his chin and undergo painful treatments to keep it on his pate when what has really been needed all along is more women who like their men bald.

Growing pains in energy

It has been a long summer for the utilities. Indeed, an innocent bystander might well have gained the impression that what so many consider the main hope for the United States to relieve its oil addiction—the nuclear power industry—was falling apart at the seams. It was not so much a matter of hot spells and brownouts or even the regathering gnat swarms of environmentalists criticizing present and future nuclear hazards. Instead, given a series of reports from disparate sources, one could be forgiven for wondering if there was something wrong structurally, if the capacity of so complex an industry to respond had reached a limit.

Late in the Spring, the Atomic Energy Commission had received *Industrial Research* magazine's Butterfingers-of-the Month award for a 2,500-gallon leak of radioactive waste into the ground at Richland, Washington. Shortly after this recognition there was another leak at Richland, followed by the discovery of an undetermined quantity of plutonium 238 in the mud of a canal nearby an Ohio weapons laboratory.

In June *Nuclear News* reported that we face a manpower shortage that will "severely limit" the country's expansion of the nuclear power industry "unless steps are taken to correct the situation immediately." Forecasting the possibility of utilities raiding each other for trained personnel, the report saw a need for 37,000 more technical people in the industry and pointed out that to shorten the time for building nuclear plants from ten to six years, as has been proposed, would "nearly double the number of nuclear trained personnel required."

In July, the AEC announced that its three gas diffusion plants in Tennessee, Kentucky and Ohio, where all of the fresh nuclear fuel used in U.S. nuclear power plants is produced, were at full capacity. They could no longer promise supplies of nuclear fuel to any new customers.

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Oh Say Can You See Discussions about whether or not we should continue to "go into space" often overlook a fundamental point—namely, that we are in space already. Each of us is an astronaut on a spacecraft called earth traveling around the sun at 67,000 miles per hour. The biological community that lives on the spacecraft has a fragile life support system—the thin film of soil, air and water in which we dwell. During the past century, the number of passengers aboard the spacecraft has increased tremendously; so also has their ability to consume its finite supplies. We see some of the results in the pollution of our environment and the decay of our resources.

As astronauts we need to monitor our spacecraft to see that we are not doing irreparable damage to its life support system. NASA has undertaken several programs which involve the development of advanced sensors. From a satellite or aircraft, these sensors can monitor air quality, determine the condition of crops, or help locate mineral resources. Currently, TRW is developing such a sensor for NASA. It is called MOCS, an acronym for Multichannel Ocean Color Sensor.

MOCS is based on the principle that sea water, plankton, and such pollutants as oil spills, sewage, and river sediments, all reflect light at different wavelengths and in varying proportions. MOCS measures these subtle differences with great sensitivity and better spectral resolution than any other available scanner. Its value lies in its ability to map the spread of pollutants as well as their effect on the chlorophyll content and other signs of health or sickness in the world's plankton beds. Only with a historical record based on hard facts, can all the arguments be settled as to whether ocean pollution has reached dangerous levels or not.

MOCS weighs less than 20 lbs., has no moving parts, and uses only 7½ watts of power. Yet it has produced some fascinating information about the spacecraft on which we live. Recently, for example, we tested MOCS by flying it in an aircraft at 37,000 feet over Clear Lake in California. MOCS showed that the lake teemed with sediments, algae growth, and foreign matter. In fact, the only thing clear about the lake was its ironic name.

We're happy to be associated with the excellent work NASA is doing in remote sensing. We hope that MOCS and other NASA sensors will help make spacecraft earth a habitable home for us all.

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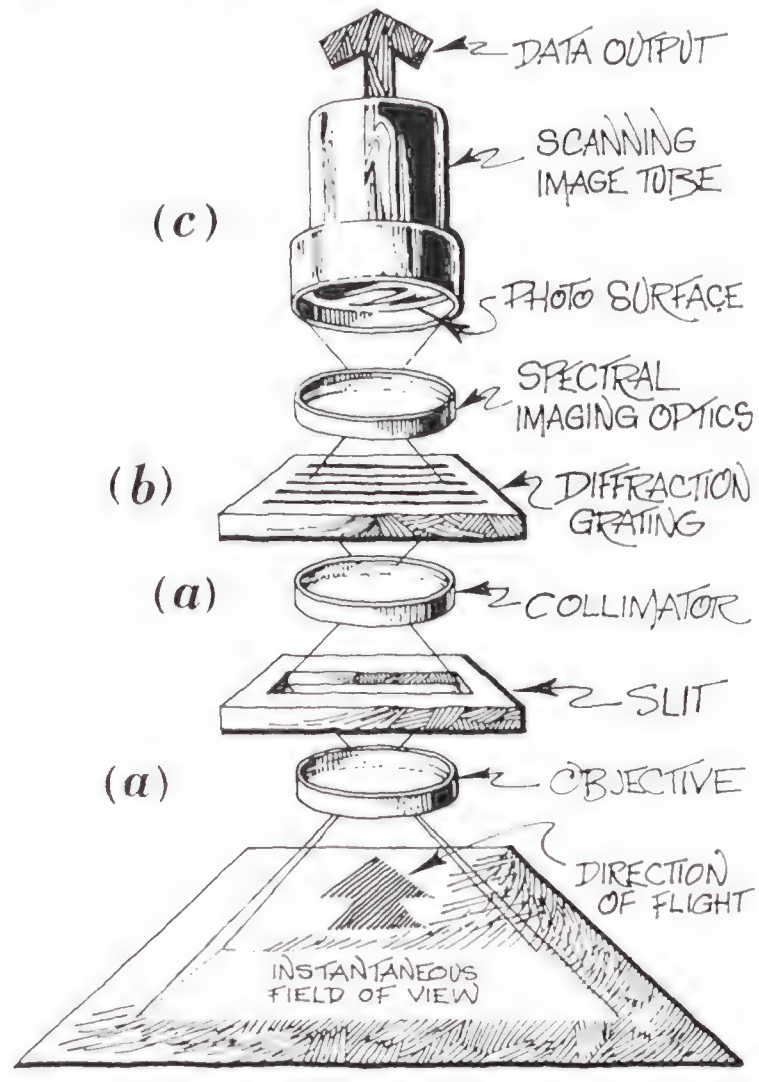

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At the same time, electric utilities were pulling in their horns in the matter of building new plants, according to the *Wall Street Journal,* thanks to high interest rates and the difficulty of raising capital. Especially vulnerable to the plague of double-digit inflation were plans for new nuclear plants, which currently take twice as long as conventional plants to build and cost 65 percent more. Even the ever-bullish Atomic Industry Forum admitted to "some uncertainties."

Late in July, General Electric reported that its brand-new Midwest Fuel Recovery Plant was "inoperable," according to a Washington newsletter, *Weekly Energy Report.* Nuclear fuel recovery takes place after the reactor core is burned up and clogged with fission products. At such a time a good deal of usable fuel can be recaptured by chemical means, along with plutonium, while high level radioactive wastes are separated for disposal (as in the slightly porous facility in Richland). The GE plant was one of but three commercial nuclear fuel recovery plants in the country. One of these, in Barnswell, South Carolina, is not scheduled to be in operation until 1977. The other, Nuclear Fuel Services in West Valley, New York, has been shut down for an undisclosed period while additions are made, and is not scheduled to reopen until 1979. So the failure of the GE plant to come on line leaves us with only one other such facility, an AEC-owned plant engaged exclusively in military work.

Now it is not considered appropriate for Americans to doubt the capacity of high technology to solve most of our problems. What else will, one may ask. And perhaps these events were not signs of pathology but merely the growing pains of an industry being summoned too early from adolescence to adulthood (though one could say that so well-endowed a 27-year childhood is a long one). Nevertheless, as one sat in the late summer heat watching the cat's cradle of technology, economics, environment and energy grow more and more tangled, one was reminded of the historian Henry Adams, who in 1893 stood before an early dynamo and wondered with a good deal of pessimism how a society would fare that hitched itself to so impersonal a star, to so gigantic a force.

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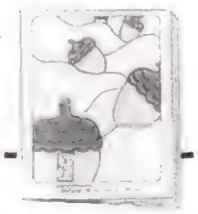

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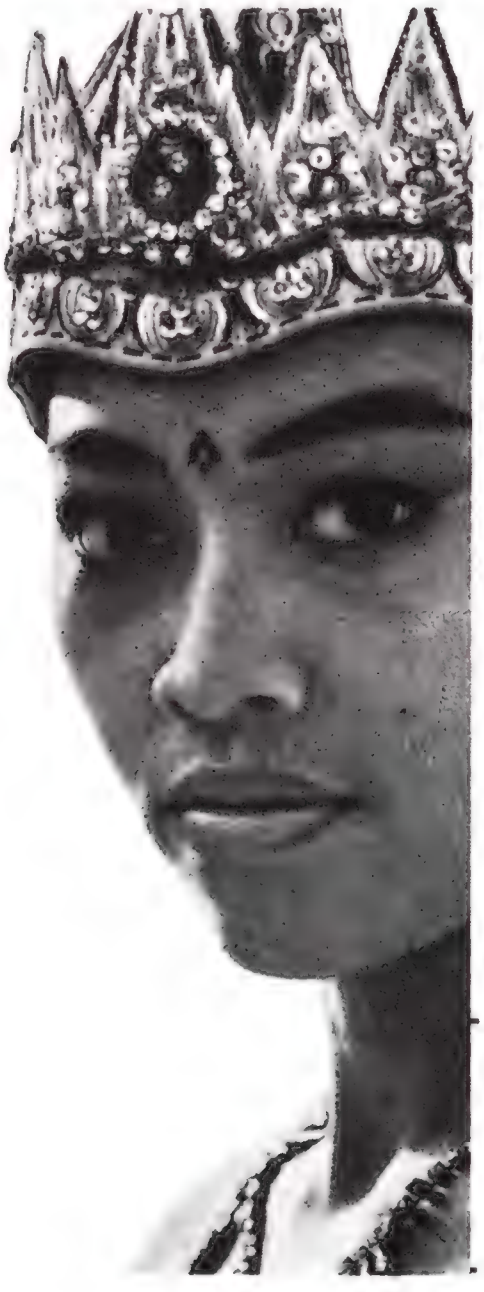

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Letters to the Editor

Wyoming boom

Dear Sir: Having lived in Casper, Wyoming, all my life,. I was interested in David Snell's article, "The new hunger for coal brings a boom to Wyoming's Sweetwater County," in the July issue.

Mr. Snell gives a good picture of what is happening here when he speaks of Sweetwater County as "the Western outpost of Appalachia," and "the booming new enterprises . . . irreversibly changing [frontier Wyoming]," and the fact that nobody is giving much thought to environmental problems. What he did not mention are the sulfuric acid runoff into streams near strip-mining areas and inadequate reclamation laws.

Recently, an Appalachian Senator spoke here, warning us not to sell ourselves out and lose our serenely natural way of life to the coal developers. His warning was: "Don't become another Appalachia—learn from our mistakes."

Some of us would rather have Wyoming be "a place to send postcards from" than a place to scoop coal from.

Gregg Sutherland
Casper, Wyoming

Golden Hinde

Dear Sir: One could only wish that Terence Spencer in his article on the *Golden Hinde* had not so casually placed Drake in San Francisco Bay on the basis of the 1936 discovery there of Drake's brass plate. The condition of the plate's patina indicates that it was not found *in situ* at that site—certainly the prior 1933 claim to discovery at Drakes Bay, with subsequent discard of the plate near San Fran-

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Begin testing a piano's action (or keyboard mechanism) by playing with a variety of touch and pressure (try loud "attacks," smooth passages, short crisp notes, etc.).

Be sure one key doesn't feel noticeably lighter or heavier to the touch than another (inconsistent action).

Try moving the keys from side to side. Too much sideways movement is a sign of poor workmanship.

Also check the action for its speed of response, and for sensitive transfer of power from you to the strings.

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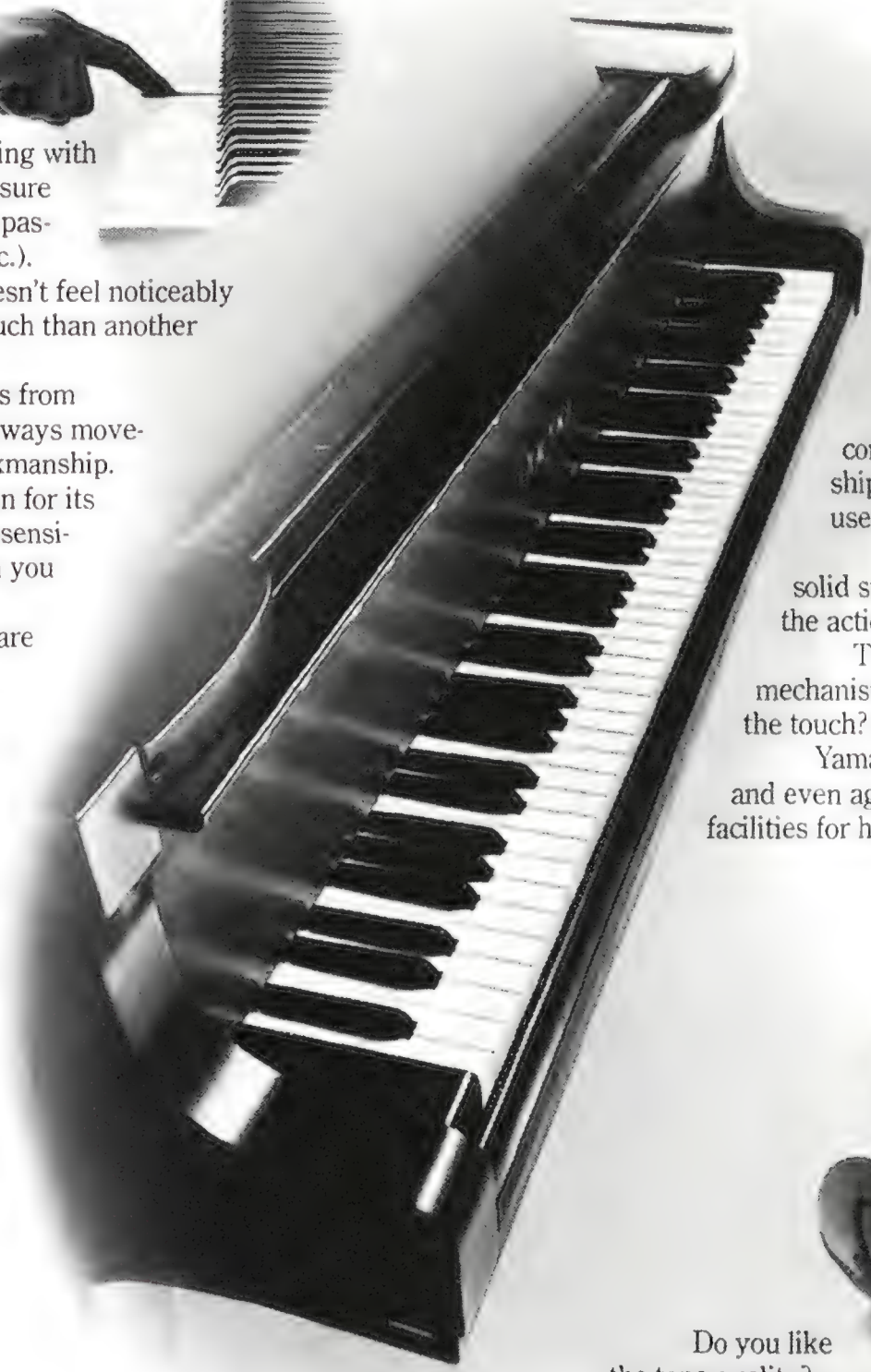

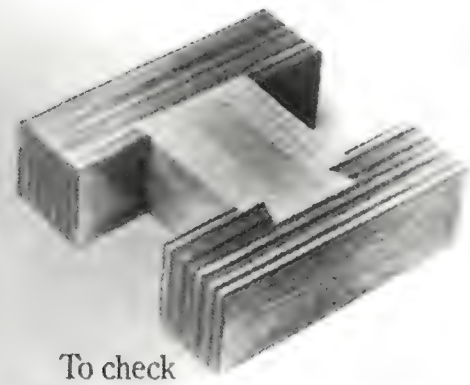

To check consistency and quality of workmanship, first find out if various materials used in the instrument are first rate.

For example, is the sounding board solid spruce? Are fine hardwoods used for the action parts?

Then examine the cabinetry. And mechanisms. Are edges and joints smooth to the touch? Can you see or feel inconsistencies?

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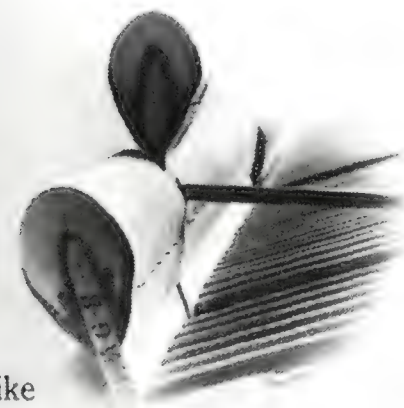

Do you like the tone quality?

However bright or mellow (etc.) you like your piano sound, check to be sure its tone character is consistent, over its full range.

Also, be sure to ask how well the instrument is built to stay in tune.

Yamaha pianos have features like a unique tuning pin block of the finest quarter sawed maple, and a sealing system we call "Humidiseal" for enduring tuning stability.

Consistency of touch, workmanship, and sound are just some of the things to look for in a piano. For a complete booklet on the subject of piano buying, write to Yamaha International Corp., P.O. Box 6600, Buena Park, Calif. 90620.

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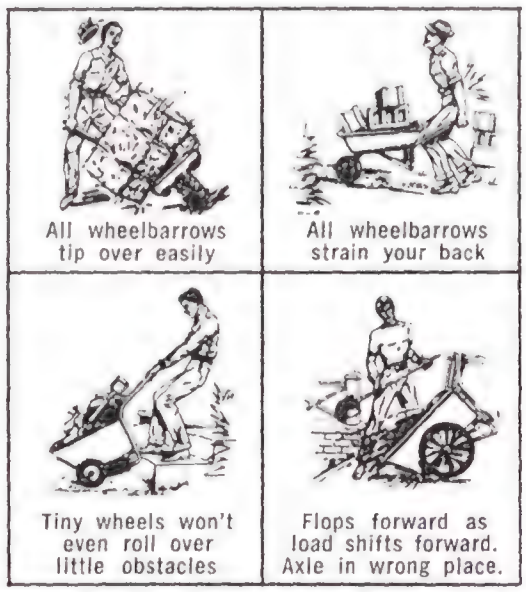
Ladies, Gentlemen:

WHY for Heaven's sake, put up any longer with the irritation and struggle with wheelbarrows and poorly designed carts as shown in drawings below . . .



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cisco Bay, is equally valid. In the latter case, the hypothesis that Drake entered the Golden Gate falls flat on its face.

Robert W. Allen
Vice President
Drake Navigators Guild
Point Reyes, California

Dear Sir: In regard to petronels (see below), mentioned in your article, what interests me is (1) how horses reacted when the little toy went off immediately over their heads, and (2) how many shots the cavalier could get off before that stake-like butt was driven through his chest.

Alan Webber
Washington, D.C.

From *The Gun and its Development* by W. W. Greener

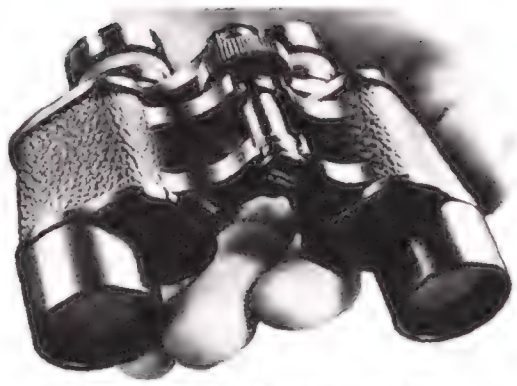
John Paul Jones

Dear Sir: There is more to John Paul Jones' story than appears in Edwards Park's Bicentennial column.

After his trouble in the Caribbean, the Scot sailor John Paul did go to Virginia where his brother lived. But soon he went to Halifax, North Carolina, where he met many of the Revolutionary intellectuals who led that state to make the first declaration of independence in the Colonies. John Paul was befriended and housed in Halifax by Willie Jones, one of the fomenters of the North Carolina declaration. Out of his great respect for Willie Jones, John Paul assumed his last name.

Whitmel M. Joyner
Durham, North Carolina

In his book, John Paul Jones, *historian Samuel Eliot Morison refers to the "Wil-*



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lie Jones myth." Morison says that it is "almost an article of faith" that John Paul was rescued and rehabilitated in Halifax, North Carolina, by Willie Jones. But, says Morison, John Paul Jones himself is the authority for saying that he went "incog." Furthermore, even though he was consistent in his gratitude toward friends who helped him, John Paul Jones never wrote to Willie Jones or sent him gifts. Ed.

Bathing machines

Dear Sir: Thank you for your delightful article on bathing machines, especially for putting an image behind the line of one of my favorite songs. For 50 years I've been singing the nightmare song from Gilbert's *Iolanthe*, which contains:

> *For you dream you are crossing the Channel, and tossing about in a steamer from Harwich—*
> *Which is something between a large bathing machine and a very small second class carriage.*

Donald D. Durrell
Durham, New Hampshire

Dear Sir: Bathing machine doors should be "discreetly" closed, not "discretely."
Marjorie Mayer
West Long Branch, New Jersey
Our error. But we trust the doors were "discrete" (individually unconnected) as well. Ed.

Yankee Jonathan

Dear Sir: Your interesting article on Yankee Jonathan reminds me of a story I'd like to confirm. I understand that a peddler was once called a "cheap man," and the name chapman was derived from it. My maternal grandfather, William Chapman, said this was the origin of his name.
Chapman Grant
Escondido, California
Mr. Grant is correct. Chapman in Britain is peddler (from Middle English chep, *meaning bargain or purchase).* Ed.

Dear Sir: Contrary to Author Richard Wolkomir's statement, Yankee Jonathan in *The Contrast* was not the first realistic American character to appear in colonial plays. Such characters had been portrayed in approximately 40 native plays written before 1787.

I have lived in New England for almost

Every Wednesday at 3:30 Exxon analyst Charles Lee and 12-year-old Peter Lewis talk about the future.

Charles Lee and Peter Lewis are part of Project LIVE—a tutoring program in which Exxon employees participate. The program is designed to help junior high school students make the grade—in school and at a good job in the future. Mr. Lee is one of a large group of Exxon employees who participate in Project LIVE. Peter Lewis was selected by his own school based on his ability to benefit from Project LIVE's "one-to-one" tutoring.

After school each Wednesday, Peter comes to Charles' office where they begin each session with class work. It may be reading, writing, arithmetic—or any other subject Peter needs help with. Charles goes over Peter's homework assignments. Helps him bone up for tests. They even talk about Charles' responsibilities as an Exxon manpower planning and placement analyst—and Peter's responsibilities as a leader on the school basketball team.

Then it's into the future as Charles takes Peter for a step behind-the-scenes—into the world of work—where Peter gets a chance to see the skills needed in modern businesses and corporations like Exxon. Here, reading and writing and arithmetic come alive—proving to Peter that his careful attention to school work today can pay off in a good career later.

While Project LIVE is one of the most personal and important ways Exxon is aiding education, it's still only one way—there are dozens of others. Including Exxon Education Foundation grants to colleges and universities. Bilingual schools for Chinese immigrants. Block schools for Spanish-speaking communities. Service station management training courses for minorities. In-class TV series for elementary school students. A program that sends black Exxon executives to black colleges as visiting professors. And many more.

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EXXON

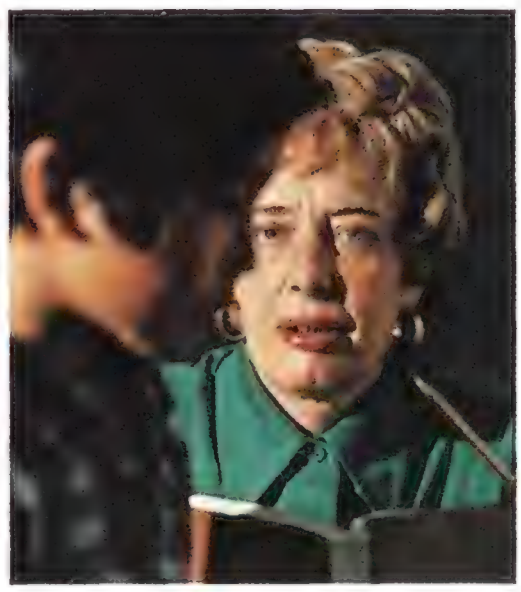
Esther and Ed

Esther Lee is a full-time clerical employee at Bethlehem Mines in the corporate headquarters at Bethlehem, Pa. In her "spare" time, Mrs. Lee is a school board director and serves on other community organizations involving church, government, education, youth, and minority groups.

Ed Skufca, a supervisor in the Railway Car Department of our Johnstown, Pa. plant is President of the 7th Ward Civic Association. One of their many community contributions is the volunteer ambulance corps that serves the 42,000 people of Johnstown.

and Rudy and Irma

Rudy Salinas, a bricklayer at our Los Angeles plant, works with several organizations that try to get Mexican-American youth and their parents and teachers working together—to prevent drop-outs, encourage post-high school education, and provide scholarship funds.



Irma Foote is a special assistant in our San Francisco Public Affairs Department. Each week during the school year, she devotes one night to helping Chinese youngsters with their homework, stressing reading, spelling, and pronunciation.

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40 years, so "smite my timbers" if I don't know something about Yankee history.
Martha R. Wright
Logan, Ohio
Although theater groups had long been active, The Contrast *was the first American comedy presented professionally.* Ed.

Book review

Dear Sir: Though I consider Eugene L. Meyer's review of my book, *Taming the Last Frontier,* generally good and fair, I was astonished to read his concluding sentence: "Today, it is a book about the 'urban crisis,' with radical solutions to yesterday's problems."

Here, as discussed in the book, are some of "yesterday's problems": water and air pollution, fouled-up urban transportation, ecological destruction caused by urban sprawl and the central cities' desperate financial plight. Mr. Meyer's phraseology, "yesterday's problems," suggests that these problems are now solved.
C. W. Griffin
Denville, New Jersey

Phenomena, comment and notes

Dear Sir: James K. Page jr. writes that Peter Rabbit was a creature of Thornton W. Burgess' imagination. As far as I know, Peter Rabbit was created by Beatrix Potter, an Englishwoman. She wrote and illustrated many stories for children, which are anthropomorphic but quite a different cup of tea from Burgess' stories.
Jeanne W. Turner
San Leandro, California
Totally different conceptions, the two Peter Rabbits differ as much from one another as they do from the equally beloved Br'er Rabbit. Ed.

The early bird . . .

Dear Sir: I have long lived by an expression which captures the true spirit of a life-style superbly displayed in "The early bird only catches the wrong train."

Upon my last-instant arrival at an event for which he had departed some half-hour previously, my ever early and coolly analytical father observed that my abiding philosophy quite obviously was "if you arrive somewhere a minute early, it's a minute wasted."
Peter C. Kissel
Washington, D.C.

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200 years ago this month

'Flummery . . . syllabubbs' at the first congress

SEPTEMBER 1774

To the Boston delegates, the journey southward to Philadelphia has been a revelation. None has traveled widely within the 13 Colonies, and there is a large element of adventure in plunging down the Post Road, past scattered farms and villages to the town of New Haven, with its broad green and its churches and brick college buildings. John Adams has noted his excitement over the trip, writing to Abigail, who will certainly want to know everything from the number of toasts downed at receptions to the fashions of the ladies in slightly dowdy little New York and, finally, in grand, sophisticated Philadelphia.

How hot it seems to the New Englanders! Adams sorely misses Boston's cool east wind as he makes for the shade of the City Tavern, "the most genteel in America," he notes. He appreciates its comforts after so many nights in lodgings along the way—wretched food and hard straw beds too often unchanged from the last sweaty traveler who rolled into them with enough rum in his belly to insure sleep.

Adams, too, is delighted at the food he is served by various Philadelphia hosts—"Turttle and every other thing—Flummery, Jellies, Sweetmeats of 20 sorts, Trifles, Whip'd syllabubbs, floating Islands, fools, etc." And "the very best Claret, Madeira and Burgundy."

But most of all, he, as well as every other delegate to this first congress, is fascinated at meeting his counterparts from the other Colonies, leaders of communities that might be on the moon for all that is known of them. He thinks James Duane of New York has a "sly, surveying eye," but is sensible and "artful." He finds Dickinson of Pennsylvania "modest" and "ingenious." He chuckles at Caesar Rodney's appearance—the Delaware delegate's head "not bigger than a large apple," but he likes him for the "sense and fire, spirit, wit, and humor in his countenance." Rutledge of South Carolina seems to have "nothing of the profound, sagacious, brilliant or sparkling" about him. He is impressed with the Virginians, Lee and Randolph.

John's cousin Sam, totally devoted to his great purpose of uniting the sentiments of these delegates, finds little time to enjoy Philadelphia or relish the experience. His ulcer keeps him away from all those flummeries and claret. He quickly sums up the other delegates and builds his social bridges to the ones who have the clout: Gadsden of South Carolina, who has been called (as Sam notes with a small smile) "the Samuel Adams of the South," Lee, finally Washington—whom he found at first an uncomfortable sort of companion, but whom he cultivates because of the obvious clout in that tall figure. After all, Washington is a real soldier, a veteran of Braddock's campaign, an authentic hero who has had horses shot out from under him, a man experienced in leadership and violent action. There is even a rumor—unfounded—that he offered not long ago to raise a thousand men and march north.

Sam Adams doesn't take much of a shine to Patrick Henry. Both are incendiaries, but Sam finds Henry too dry. Odd, that. For during a debate on procedures, Henry declares, "The distinctions between Virginians, Pennsylvanians, New Yorkers, and New Englanders, are no more. I am not a Virginian, but an Amer-

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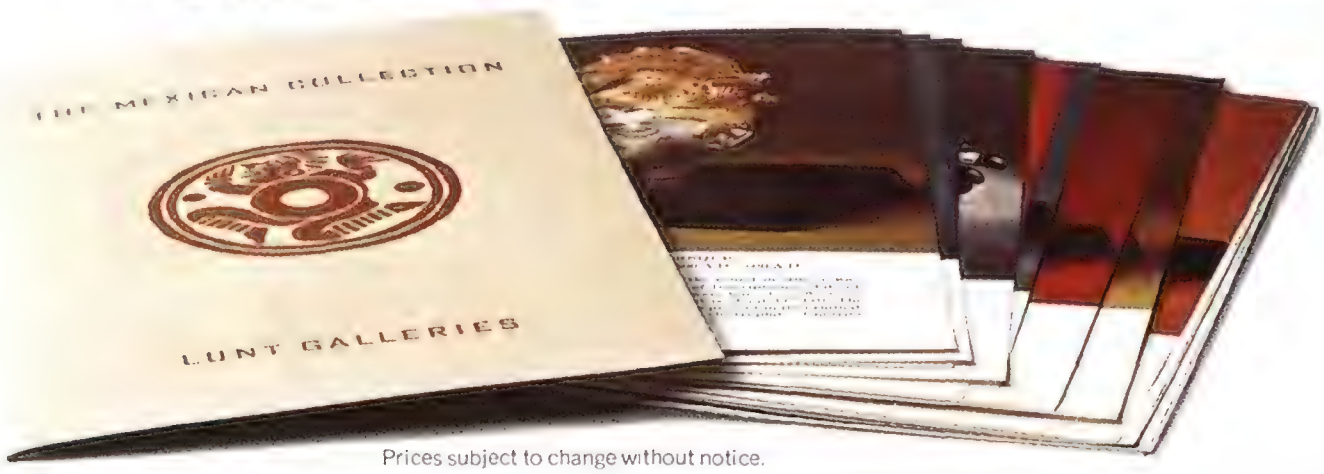

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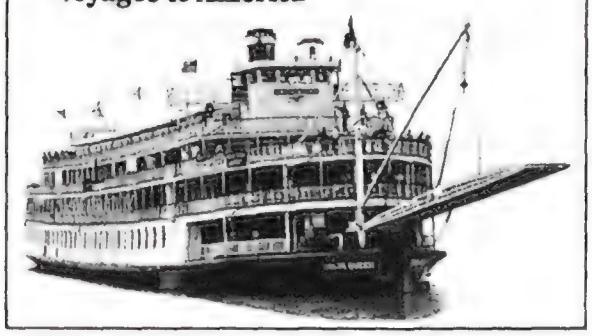

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ican." That's the sort of meat that Sam Adams has also been dishing out ever since he organized the Committees of Correspondence.

The Adamses, Robert Paine, Cushing and Bowdoin are on best behavior, tiptoeing through the long hot meetings at Carpenter's Hall so that they can live down the rather notorious reputation Massachusetts has acquired as a revolutionary hotbed. They succeed so well that Caesar Rodney—he of the apple-sized head—writes his brother that the Bostonians "are moderate men when compared to Virginia, South Carolina and Rhode Island."

Then, on the 16th, Paul Revere shows up, dusty and thirsty and mud-spotted after a long journey from Boston. He carries the minutes of a county meeting—Suffolk County, where Boston itself lies—which have been deemed so important that they must be read at Philadelphia in front of all these Colonial delegates. Briefly, these Suffolk Resolves call the Coercive Acts unconstitutional; they recommend a complete cessation of trade with Britain; they call for military training among the Colonials. Perhaps to the surprise of the Massachusetts delegation—surely the pleased surprise of Sam Adams—the Resolves are quickly and unanimously endorsed. To all intents and purposes, the Philadelphia congress has declared a sort of war on England.

One of the British Acts labeled "Intolerable" by the Americans, along with all the others, is the Quebec Act. Here is a strange paradox: Those acts designed to punish Boston were pushed through Parliament on a wave of anti-American emotion. But the Quebec Act, which happened to be revealed to the Americans at the same time, is actually a carefully wrought piece of statesmanship. It provides for an extension of the Canadian boundary to the Ohio River and, with sweeping tolerance, allows the French settlers of Quebec to keep their lands and their Catholic faith. This makes fully legal the pledge given by the English to the defeated French at the Treaty of Paris that French liberties would be safeguarded. It has the effect now of making the French Canadians at least more or less contented if not devotedly loyal.

But the British-Americans farther south regard the Quebec Act as yet another example of Parliament's thoughtless arro-

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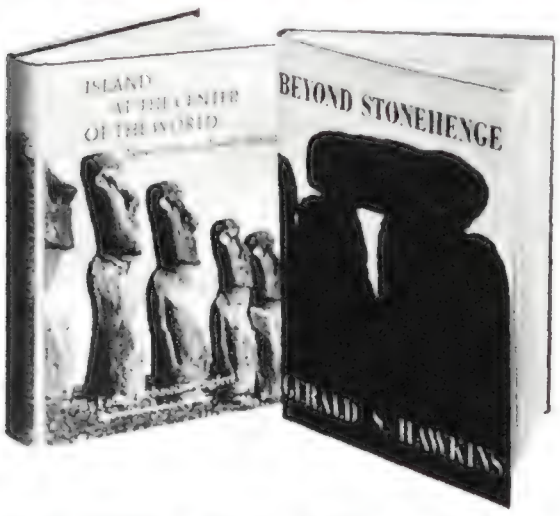

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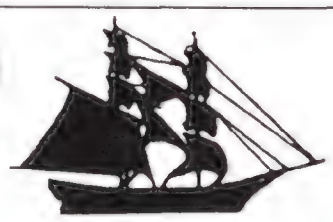

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gance. The new boundary for Canada cuts right across the ancient grants and charters of some of the northern Colonies, whose western frontiers extended (on paper at least) to the Pacific.

Moreover, this eastern seaboard of Protestant English settlements suddenly finds itself hemmed in by a Catholic French neighbor. Northerners feel nothing but outrage at the Quebec Act. Here in Philadelphia they make that outrage very clear.

News of the activities in this first congress will take at least a month to reach Britain, yet King and Parliament are already aware, by a mixture of experienced deduction and gut reaction, of the kind of news it will be. "The die is now cast," King George writes to Lord North on the 11th. "The colonies must either submit or triumph. I do not wish to come to severer measures, but we must not retreat; by coolness and an unremitted pursuit of the measures that have been adopted I trust they will come to submit."

And why not? Letters from the troops stationed in Boston indicate that Amer-

Some Colonial delegates

icans are feckless poltroons, unable to do more than wince no matter what the redcoats do to provoke them. London is generally bored with all the events across the Atlantic. Writes Lord Burke: "The American and foreign affairs will not come to any crisis sufficient to rouse the public from its present stupefaction during the course of the next session."

One unstupefied Englishman slips aboard the *London Packet* and sails for America, short on luggage but long on ideas. Tom Paine has at last taken the step that his older friend Benjamin Franklin has been urging.

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From Io, an inner moon, the nightside of Jupiter looms large against the stars. Bright flashes on the giant planet send bursts of electricity to trigger the yellow glow in Io's ionosphere.

Paintings by Ron Miller

By Henry T. Simmons

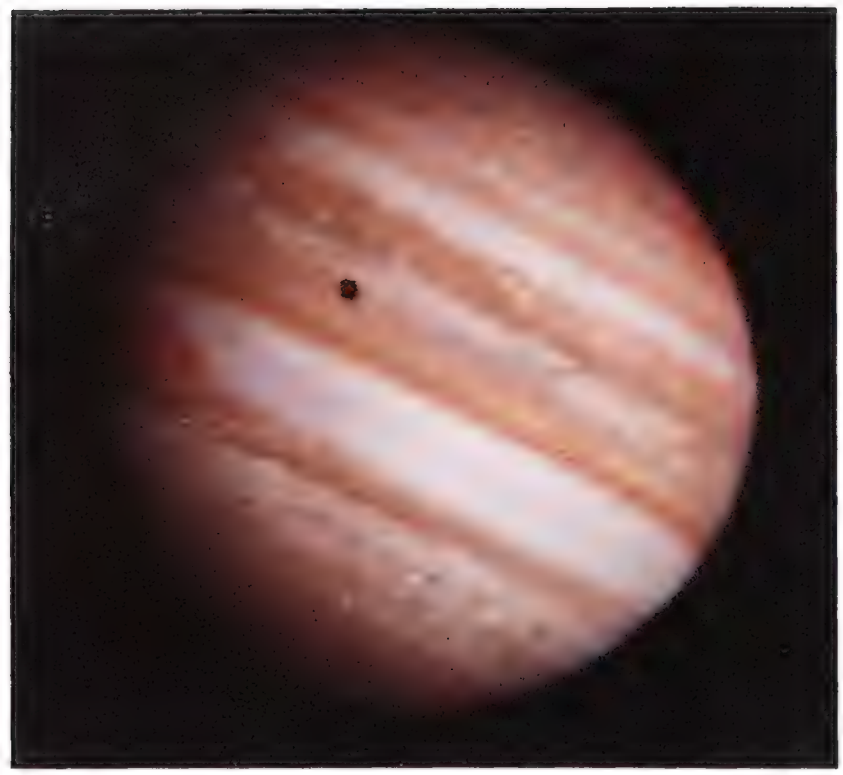
Mighty Jupiter could be star that didn't make it

Flying by the largest planet, the fragile Pioneer 10 found a celestial cyclotron and hints that Earth may have had two suns

Jupiter, the mightiest planet in the solar system, has fascinated men ever since Galileo turned a telescope on it nearly 365 years ago and discovered a miniature solar system. Now a spacecraft has given us a close-up look, and it turns out that Jupiter indeed may be a failed star with its own retinue of proportionately sized planets. It is now certain that the environment around the giant planet is a deadly zone of fierce radiation; mammoth electrical discharges may arc across space from planet to moon (as at left). The spacecraft, Pioneer 10, survived the encounter and is now headed out of the solar system; we are still digesting what it discovered during its brief hours in a planetary hell.

Pioneer's most spectacular return was crisp color imagery of Jupiter's streaming bands of clouds (see p. 32). About 80 pictures were taken from an angle never viewed before by the human eye. Many are more detailed than anything achieved by the most powerful telescopes on Earth. As the 570-pound craft arced past the planet within 81,000 miles of its swirling cloud tops, it also mapped the vast Jovian magnetic field and the charged particles trapped in it, studied the planet's upper atmosphere and provided a far more accurate picture of the masses of Jupiter itself and its large inner satellites than could be constructed by observation from Earth.

Jupiter has fascinated astronomers because it may be a remnant of the earliest chemistry of the solar system. Its composition may be that of the primordial nebula of gas and dust from which the sun and planets



In a Pioneer 10 photo, Jupiter, not quite full, shows the Great Red Spot and the shadow of a passing moon.

are believed to have condensed 4.6 billion years ago.

Unlike the small, dense, rocky planets of the inner solar system—Mercury, Venus, Earth and Mars—Jupiter consists predominantly of the two lightest elements, hydrogen and helium. With a mass 318 times that of the Earth, it has 2.4 times more mass than all the other eight planets put together. Yet its density is only 1.3 times that of liquid water, only slightly less than the sun itself and far less than Earth's 5.5. This accounts for Jupiter's enormous volume—1,319 times greater than the Earth. Because of its very rapid rotation, giving it a day of only 9 hours and 55 minutes, Jupiter bulges outward at the equator. Its equatorial diameter of 89,000 miles is about 12,000 miles greater than its polar diameter.

In 1967 radio astronomers detected an intriguing feature of the planet: It radiates more heat into space than it receives from the sun. Because it is five times more distant from the sun than the Earth, Jupiter receives only about four percent as much sunlight, and is therefore extremely cold, with an average temperature of −229 degrees Fahrenheit just above its cloud tops. But calculations have shown that Jupiter should be some 40 degrees colder if it depended wholly on solar energy, leaving the inescapable conclusion that a mysterious heat source is at work in the planet.

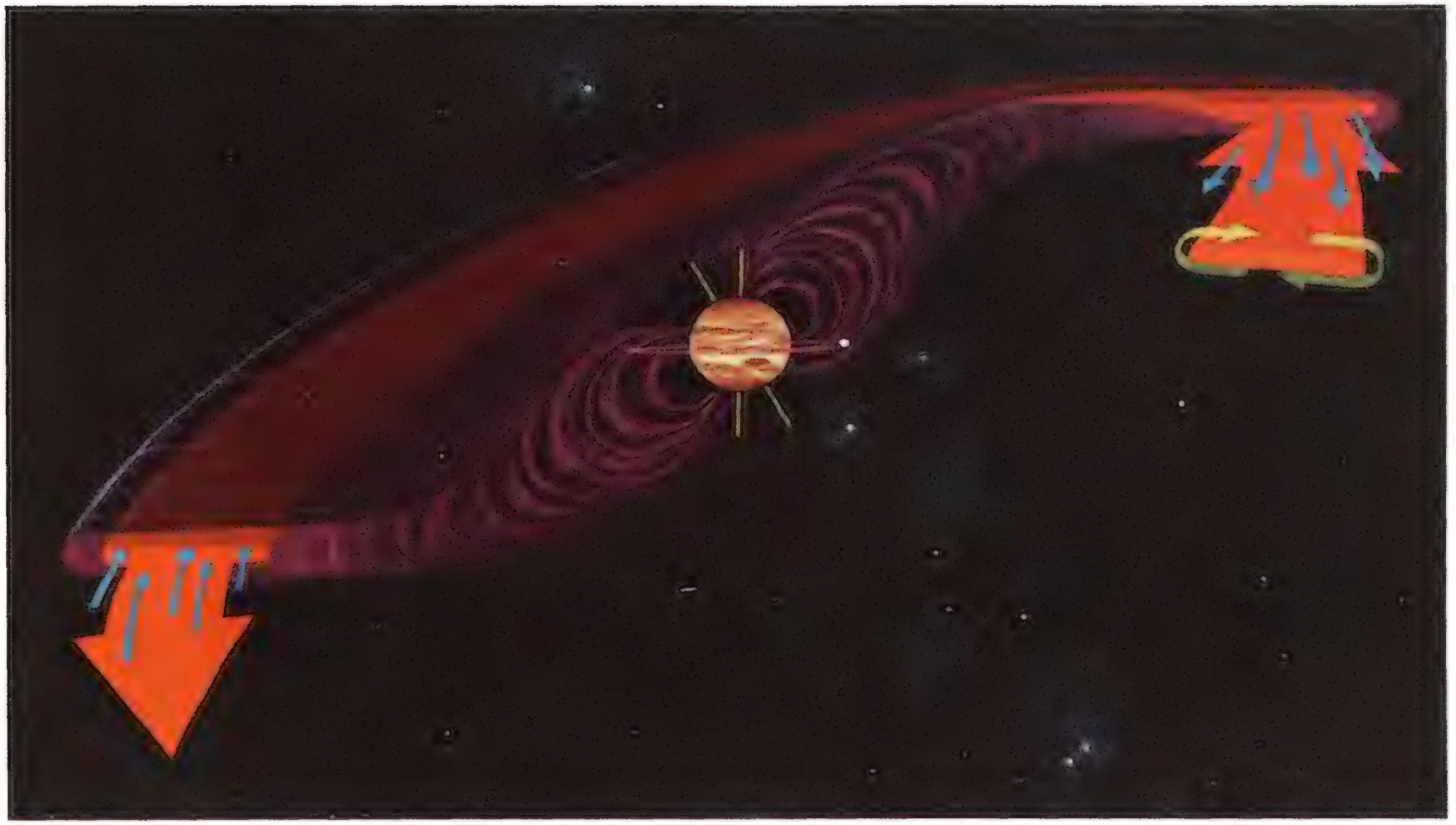
"One may wonder whether an object as massive and hot as Jupiter could not be a small star," observed two NASA scientists, Robert Jastrow and S. I. Rasool, in 1967. "Is it possible that there could be a dimly glowing nuclear fire at the center of the giant planet?" Their answer to that question was definitely no, because stars need an enormous mass to produce central temperatures and pressures high enough to ignite thermonuclear reactions. Large as it is, Jupiter has less than a thousandth the mass of the nearest star, the sun, and it has been calculated that it would require 30 to 80 times its present mass to achieve the minimum size for even a dim dwarf star.

Nevertheless, the planet exerts great influence in the solar system, second only to the sun. Pioneer 10 confirmed that Jupiter, like the Earth, generates a magnetic field surrounding the planet, and that swarms of charged particles—protons and electrons—are trapped in this "magnetosphere." In the case of Jupiter, however, the field is about ten times stronger than the Earth's, and it has a vastly greater extent.

As Pioneer neared this stage of its 21-month journey to Jupiter, it crossed the "bow shock" of Jupiter's magnetosphere about 4.8 million miles from the planet. Similar to the way rushing water piles up and flows around an obstacle, the shock in this case is produced when the solar "wind"—a plasma of electrons and protons blowing constantly out of the sun—collides with the edge of the Jovian magnetosphere. The maximum size of its magnetosphere is 20 million miles, about 80 times the Earth-moon distance.

The ability of the Jovian magnetosphere to hold off the solar wind at such a great distance testifies vividly to the tremendous scale and strength of the planet's magnetic environment, and it suggests that Jupiter might be surrounded by far more intense belts of trapped radiation than the craft's designers had expected. The radiation was the major uncertainty in the Pioneer mission, and six of the 11 instruments in

A former space correspondent for Newsweek,
Henry Simmons writes on science and engineering from his Washington office.



The lines of magnetic force around Jupiter are stretched out into a disk by its rapid rotation. Such a magnetic field sets up electrical current (large arrows) around the planet; electrons (small arrows) go the other way. Charged particles are captured by the current and orbit around it in turn (circular arrows at right). Just to the right of Jupiter is Io, innermost of the four Galilean moons.

its 65-pound scientific payload were devoted to monitoring the trapped particles.

This concern over the radiation was entirely appropriate. As the craft approached within half a million miles of Jupiter, steadily picking up speed, the scientists noted that the radiation intensity was registering a new peak every ten hours, and they feared the craft would not survive to reach its point of closest approach, within about one Jovian diameter, when the radiation would be most intense.

"It was a tension-filled and dramatic evening," recalled J. Walker Fillius, a physicist at the University of California at San Diego, whose detector recorded a peak intensity of 13 million electrons per second with sufficient energy to penetrate several centimeters of brass. "We were biting our nails to see if the spacecraft would survive—and it did, just by a hair. The trajectory was just about as close as we could have gone."

What saved the mission was the strong confinement of the energetic particles to the region of the Jovian magnetic equator. Pioneer was traveling from south to north as it flew by Jupiter, and spent little time near the equator. Pioneer discovered that Jupiter's extremely fast rotation exerts such great centrifugal force on the outer magnetic field lines that they tend to stretch outward from the planet in the form of a thin, elongated disk. Since Jupiter's magnetic poles are offset 15 degrees from its axis of rotation, this disk nods up and down like a flow meter. It was this nodding that produced the ten-hour peaks in radiation intensity as Pioneer approached the planet.

Because the particles trapped in the disk exert magnetic forces of their own, a ring current is set up within the disk, in which electrons and protons move around the planet in opposite directions. The disk does not seem to be rigidly connected to the inner field lines, so that as it nods up and down, its outer edges also seem to flap like the brim of a sombrero in a high wind. This conception of Jupiter's magnetosphere is becoming known as the fedora model. James Van Allen, discoverer of the Earth's radiation belts in 1958, believes that the complex configuration of the Jovian magnetosphere allows it to accelerate particles to high energy when it is compressed inward by gusts of solar wind, and that these particles can then escape their magnetic confinement.

In fact, Pioneer scientists now realize that Jupiter on occasion behaves like a gigantic cyclotron, squirting bursts of energetic particles in all directions. Looking over their records of Pioneer 10, they discovered

Seen from Ganymede, a more distant Galilean moon, Jupiter assumes proportions more familiar to us.

that it detected bursts of charged particles apparently originating from Jupiter more than six months before it reached the planet, at distances of more than 100 million miles. Even more striking, a reexamination of particle "events" monitored over the past decade by high-altitude Earth satellites has disclosed that numerous bursts occurred when there was no significant solar activity to account for them. The bursts were detected, however, when Jupiter and the Earth were aligned on the same magnetic field line extending out from the sun—strong presumptive evidence that Jupiter is driving particles deep into the inner solar system, against the solar wind.

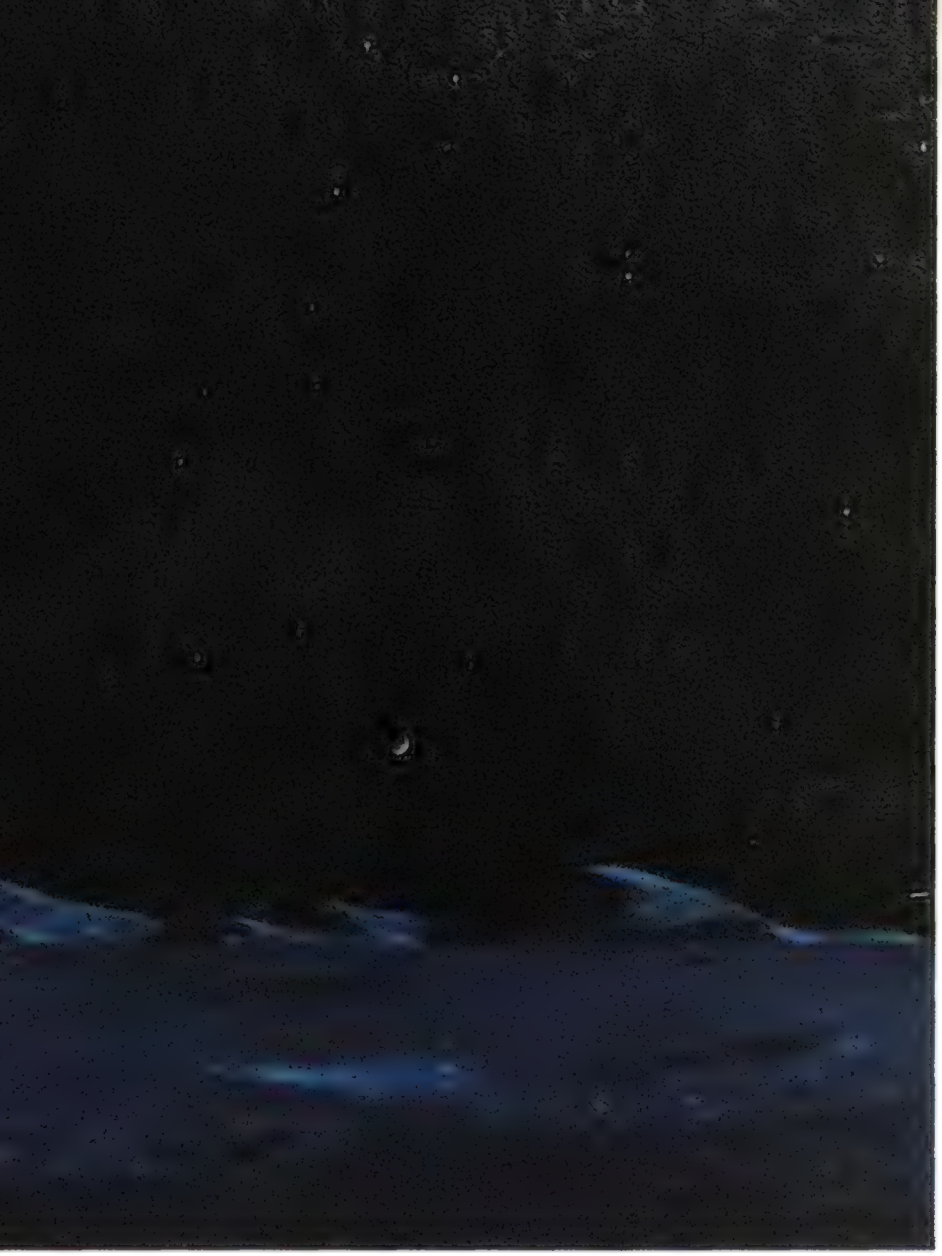
"It has really turned out that the rapidly rotating magnetic field of Jupiter combined with the distribution of high-energy particles gives us a new combination of physical phenomena we knew existed but which are submerged on other planets," remarked John Simpson of the University of Chicago. "They give us a chance to break out the processes for Jupiter's acceleration of particles, one of the most important results of the Pioneer encounter."

While the Jovian magnetic field is highly disordered by rotational forces at great distances from the planet, the inner region of the magnetosphere is more orderly, with a pattern of arcing field lines resembling those produced by a bar magnet on iron filings. The inner region of the magnetosphere, within 500,000 miles of the planet, is where Pioneer encountered its most intense radiation. The trapped radiation in this region is thousands of times more intense than in the Earth's radiation belts. One of Pioneer's instruments reported that the craft had absorbed a total radiation dose 1,000 times the lethal dose for human beings.

With respect to the planet itself, Pioneer's instruments returned data supporting the idea that its complex and dynamic atmosphere is driven by some internal heat source. The infrared radiometer confirmed that Jupiter indeed is emitting about 2.5 times as much heat as it receives from the sun. As the craft disappeared behind the planet, its radio signal grazed the top of the atmosphere and then was gradually extinguished. Analysis of the signal changes during this period disclosed the existence of a hitherto unsuspected heat-trapping layer, high above the cloud tops, with a temperature slightly above freezing, more than 200 degrees warmer than the temperature close to the cloud tops. What this layer hundreds of miles above the visible cloud tops might be is a mystery, but one possibility is that is consists of dust or aerosol particles which have absorbed solar radiation.

The most striking evidence that Jupiter's unique meteorology is thermally driven from below is in the pictures obtained by Tom Gehrels of the University of Arizona. The planet's clouds of ammonia and methane are organized into parallel bands by the forces of its rotation. The lighter, yellowish stripes are called "zones," and the darker, lower and warmer regions between them "belts." For example, the Great Red Spot, large enough to swallow up three Earths, is located in the planet's South Tropical Zone.

Gehrels believes the Great Red Spot is a towering cloud mass, warmest in its central region, but cooling



and subsiding at the edges so that we may look more deeply into the atmosphere. The suggestion of a cellular structure in the dark belts is also indicative of turbulent thermal convection.

Particularly interesting is a bright nucleus in the Equatorial Zone trailing a white plume some 40,000 miles long. It gives the impression of a cloud mass driven upward from below, but anchored to a point in the lower, denser atmosphere which is rotating more rapidly than the clouds of the Equatorial Zone. These clouds themselves are moving at 22,000 miles per hour. (A point on the Earth's equator is moving at 1,000 miles per hour.) Although the cloud movements are predominantly parallel to the equator, the pictures disclose a surprising amount of north-south swirling motion between the bands in the northern hemisphere, and even a suggestion of cyclonic motion.

Critical to an understanding of Jupiter's processes is a determination of its composition and interior structure. Pioneer established that Jupiter's atmosphere is almost 20 percent helium. (Some 80 percent is thought to be hydrogen, with the balance in other elements and compounds like ammonia and methane.)

According to William B. Hubbard of the University of Arizona, it now appears that Jupiter has a temperature of 40,000 degrees in its core. Because of the tremendous pressures of the interior, the hydrogen is compressed into a metallic phase, and this is molten at the high temperatures of the interior. As in the Earth, Jupiter's molten core works like a dynamo to generate the planet's vast magnetic field. The heat source may be the primordial heat stored in its central regions when the planet condensed, and which is now being released by gravitational contraction. It has been calculated that an annual contraction of only one millimeter in Jupiter's diameter could account for Jupiter's excess heat; alternatively, Hubbard suggests, it may come from the gravitational energy liberated by helium as it sinks to the interior of the planet.

As interesting as Jupiter are its four major satellites —Io, Europa, Ganymede and Callisto. Called the "Galilean moons" after their discoverer, the satellites revolve around Jupiter very close to the plane of its equatorial rotation. Because they systematically decrease in density from Io out to Callisto, and because of the regular spacing between their orbits, it is thought that they condensed from the same collapsing cloud of gas and dust as Jupiter itself. According to one model of this process, Jupiter was extremely hot during the final collapse or accretion phase, radiating perhaps one percent as much heat energy as the sun, and this had the effect of driving the lighter, volatile elements away from the inner moons, while leaving the outer moons more enriched in the lighter elements. A similar process is thought responsible for the density distribution of the inner solar system, which decreases from Mercury out to Mars, followed by a sharp drop-off in the density of the four "gas giants"—Jupiter, Saturn, Neptune and Uranus.

Io's role in radio signals

Pioneer also flew behind the innermost of the major moons, Io, and the manner in which its radio signal was extinguished demonstrated that Io not only has a thin atmosphere but a conducting layer of charged particles, or ionosphere, at an altitude between 40 and 90 miles. This is an intriguing discovery, for observation of Jupiter's radio outbursts—it is second only to the sun as the noisiest celestial object—have indicated that the radio static from the planet is of the same character as that produced by lightning discharges on Earth, but immensely more powerful. These radio bursts, which have the power of several hydrogen bombs, appear to be coordinated with the 41-hour revolution of Io, which orbits the planet at a mean distance of 262,000 miles. It is possible that Io's conducting ionosphere serves as a "lightning rod" and the satellite is a focal point for the electrical discharges (see p. 30).

Another interesting feature of Io is the fact that it

sweeps up the energetic particles from the intense Jovian radiation belts. Pioneer measured distinct drops in radiation intensity as it crossed the orbits of Io and Europa, indicating that the two moons were eliminating the charged particles along their orbits. In the case of Io, Pioneer detected an enormous halo of atomic hydrogen accompanying it in its path around Jupiter. The scientists conjecture that when energetic protons collide with Io or its atmosphere, the particles are slowed, pick up electrons, and become excited neutral hydrogen whose ultraviolet glow was detected by Pioneer.

A primary goal of the Pioneer flight was to assist in the design of future space probes and their flight trajectories. In charting the Jovian radiation belts, Pioneer 10 has established that its sister craft, Pioneer 11, due to arrive at Jupiter in December, may be flown past the planet within 20,000 miles of the cloud tops over the south polar region. Though Pioneer 11 may encounter higher peak radiation in swinging much closer to Jupiter than its predecessor, it will cross Jupiter's magnetic equator at a steeper angle. Since this is where the most intense Jovian radiation is confined, it should experience a lower total dose of damaging radiation than Pioneer 10. The close flyby trajectory is important because Jupiter's huge gravitational field will bend Pioneer 11's flight path sharply around and impart sufficient additional speed—about 110,000 miles per hour—so that it can fly by the sixth planet, Saturn, in September 1979.

The flight path of Pioneer 10 was used to compute a far more accurate distribution of the masses of the Jovian satellites. By tracking the frequency shifts of the radio signal from Pioneer, scientists could detect changes as small as a few tenths of a millimeter per second in the velocity of the spacecraft. From these small shifts, produced by the gravitational at-

Jupiter and its major satellites (center and right) form a striking analogy with the sun and the inner

planets (upper left and right; the Earth and its moon, second from right.) It may be that Jupiter is a failed star, and our system might have had two suns with planets revolving around each other.

traction of the satellites and their huge primary, the scientists have measured the masses of the Jovian satellites to an accuracy of better than one percent.

The major surprise in this exercise once again was Io. Its mass proved 20 percent greater than it had been measured from Earth, jumping from 0.99 of the mass of our moon to 1.22. Callisto gained about 0.15 of a lunar mass, there was no change for Europa, and Ganymede lost about 0.1 lunar mass. These may seem trivial changes, of interest only to astronomers, but they may have great practical significance. The space agency is drafting plans for Jupiter-orbiting spacecraft which will exploit the gravitational fields of the Gallilean satellites. Future Jupiter orbiters will also be able to obtain close-range imagery and scientific data from these fascinating bodies.

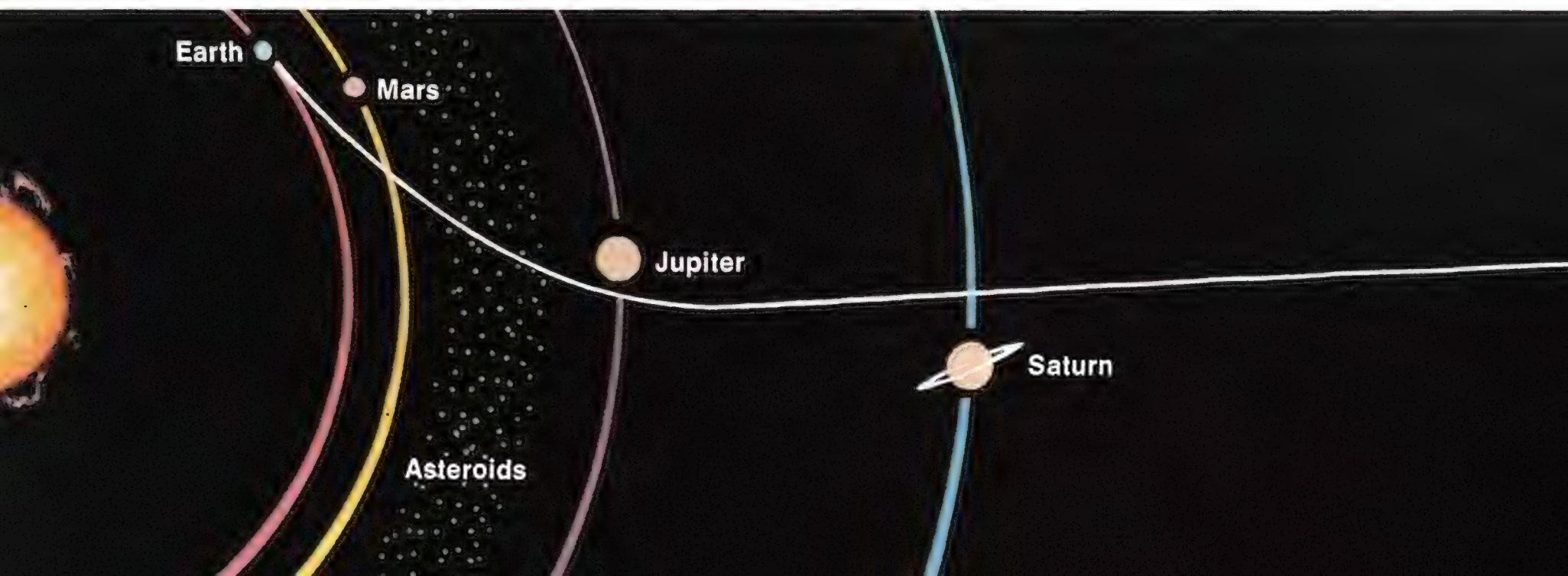
Perhaps Jupiter's greatest significance lies in what it can tell us about the way the solar system formed and evolved, and, by inference, about the formation of other star systems, which might also have planets and possibly even life. Though Jupiter is much too small and cold to be a star—its interior would have to be 1,000 times hotter than presently calculated to ignite thermonuclear reactions—nevertheless it possesses many starlike characteristics: great size, an elemental abundance corresponding with that of the sun, net heat output, and a family of major satellites which duplicate the density pattern of the inner planets. (Jupiter has eight other moons, some of which appear to be captured asteroids.)

It was D. McNally of the University of London Observatory who suggested that Jupiter might be a "failed star." According to McNally, two different processes formed the planets of the solar system—an accretion process in which the dense inner planets were physically assembled from a high density shell of dust and gas surrounding the "proto-sun," and a second process, involving gravitational instability and collapse of the gas cloud in the outer solar system, which formed Jupiter and the other gas giants.

"The Jovian planets are the remnants of other attempts to form stars contemporaneously with the sun," he summed up last year.

Why did Jupiter fail to become a star? Most students of the subject, McNally included, think that Jupiter's tremendous rotational speed played an important role in preventing its accumulation of a sufficient mass to become stellar. If the portion of the nebula from which Jupiter formed was already rotating, the planet's rotation would increase as its physical dimensions contracted, in the same way that a figure skater can increase her rate of spin by pulling in her arms. Under these circumstances, centrifugal force would come to dominate gravity, the planet would lose mass from its equatorial plane as fast as it pulled mass into its polar regions, and its growth into a stellar mass would be inhibited. Presumably the sun itself formed from a mass concentration in the heart of the

This schematic shows the timetable of Pioneer 10 from launch in 1972, past Jupiter last year, past Saturn in 1976, Uranus in 1979, and then Pluto and out of the solar system in 1987.



primordial nebula which had relatively little rotational velocity, and this allowed it to gather in sufficient mass to become a respectable star.

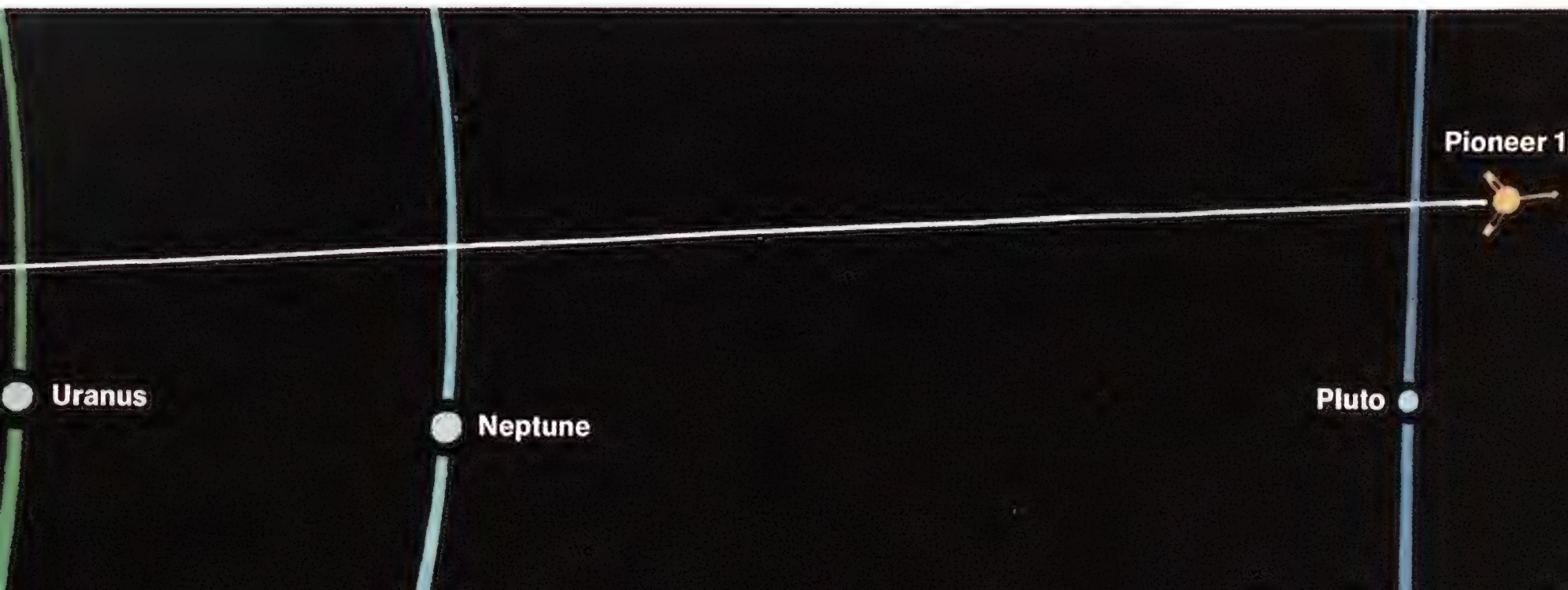
It is significant that most of the stars in the immediate neighborhood of the solar system are binary and multiple star systems, and the average distance between the stellar pairs is about ten times the Earth-sun distance, or approximately the distance of Saturn's orbit from the sun. It would appear that star formation is the usual end product of the condensation of an interstellar cloud of dust and gas, but not always. As McNally suggests, rotational forces may constitute an important brake on the formation of stars. Consequently, there may be an appreciable number of single stars with planetary systems; in our galaxy of 250 billion stars, scientists estimate that perhaps 100 million planets exist which are capable of supporting hydrocarbon life forms such as exist on Earth.

It is difficult to imagine what our solar system would be like if Jupiter had been able to assemble sufficient mass to become a star. Even with its present mass, Jupiter is believed to have played a decisive role in ejecting the spray of meteorites which bombarded the inner planets and the moon during the first several hundred million years of their history. A Jupiter enlarged to stellar size would engage in a constant tug-of-war with the sun for the inner planets, including the Earth, with the result that their orbits, climates and seasons would be vastly different from what they are today. Under such circumstances, life might be able to achieve a foothold, but it is difficult to see how it might have evolved into an intelligent species. Thus the manner in which the solar system formed in a single star and a retinue of planets is a decisive element in the myriad chain of accidents and forks in the road which led to life and mankind.

As for Pioneer 10, it is now headed out of the solar system (see below). Accelerated to a speed of 82,000 miles per hour by Jupiter's great gravitational field, the craft will cross the orbit of Saturn in 1976. Between the increasing distance and the dwindling power of its generator, communication with the craft may fail by the time it reaches the orbit of Uranus in 1979. In 1987, 15 years after launch, the craft will cross the orbit of Pluto and drift into interstellar space in the general direction of the constellation Taurus, its velocity away from the solar system now reduced to about 25,000 miles per hour.

Since Pioneer 10 is the first human artifact to escape the solar system, the space agency saw fit to mount a small gold plaque on it carrying a message for any technologically advanced civilization which may find it. On the plaque is a simple drawing which depicts the planets of the solar system, notes that the Pioneer was launched from the third planet, and describes the location of the solar system in the galaxy by reference to the pulsating neutron stars ("pulsars"). Drawn to scale against the outline of the Pioneer spacecraft and its nine-foot directional antenna are two human figures, a man and a woman. The man's right hand is raised in what is meant to be a gesture of goodwill. A wavelength for radio communication is suggested.

The odds against an alien intelligence ever discovering this "message in a bottle" seem astronomical. Millions of years will pass before it approaches another star system. Most scientists believe that if contact is ever achieved with extraterrestrial intelligence, it will take the form of electromagnetic communication, not physical commerce. Studies of the solar system, including the Pioneer findings on Jupiter, the "failed star," increase our expectation that there are star systems with planets hospitable to life, and perhaps even intelligence and technical civilization. Achieving contact with such a culture would be a momentous event in human history, the stunning realization that we are not alone.



Sister Elsie McCool, 73, stands beside granite gatepost before Sabbathday Lake, Maine, meeting house.

By Richard L. Williams

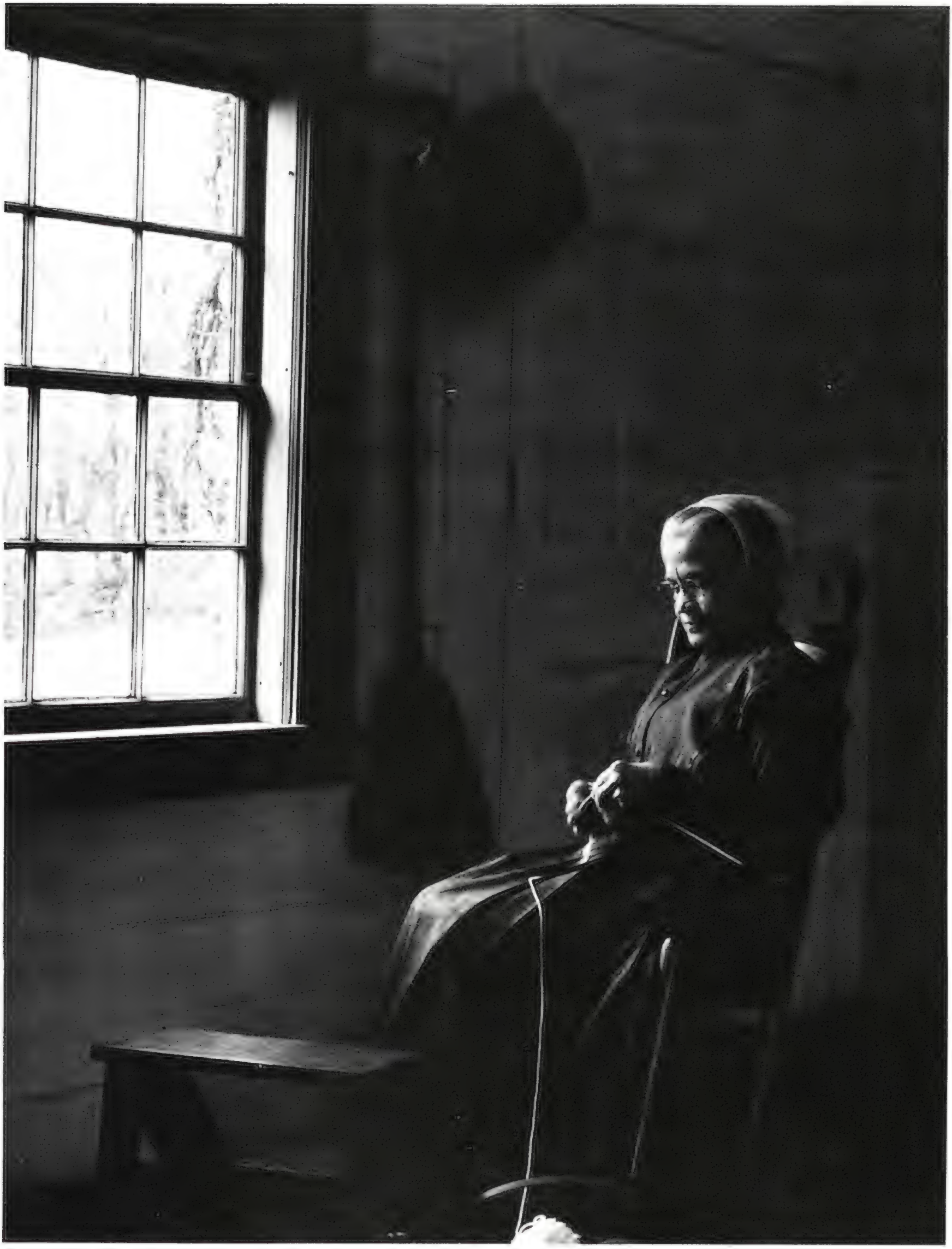
The Shakers, now only 12, observe their 200th year

Determined in the face of intolerance, sternly hewing to vows of chastity, they built rich and austere farm communities designed to last

Photographs by Alfred Eisenstaedt

In Cleveland next month, scholars and friends of Shakerism will gather at the Shaker Bicentennial Convention, thus beating by more than a year the celebrations of the nation's own Bicentennial. It will be a 200th-birthday observance for the remarkably tenacious little religious sect that, in America, started out with nine members, reached a peak of about 6,000, and is now down to its last dozen. The convention, jointly sponsored by the Shaker Historical Society and the Western Reserve Historical Society, will hear from authorities on Shaker architecture and invention, Shaker cooking and herbs, Shaker manuscripts and music, and Shaker theology.

The meeting promises to be well attended because of reviving public interest in The United Society of Believers in Christ's Second Appearing, as the order originally was known. However, few of the 12 surviving Shakers, ten of whom appear on these pages (the other two are ill), all female and all resident in the two remaining villages of the society, are likely to show up, although privately both villages will have their own ceremonies. Most of them already have made one



Wearing her traditional cap, Sister Gertrude Soule, 80, knits in the summer kitchen at Canterbury, New Hampshire, settlement. This group carefully maintains the cap; Sabbathday Lake Shakers do not.

Dancing the "square order shuffle," early Shakers carry out an important aspect of the sect.

They were referred to as Shaking Quakers because they shook out all things carnal.

rather tiring Bicentennial-year trip from New England into the world outside, visiting an exhibition of the Edward Deming and Faith Andrews collection of Shaker furniture and implements at the Smithsonian's Renwick Gallery in Washington last winter. However, Eldresses Bertha Lindsay and Gertrude Soule, who represent the Parent Ministry of the Societies, will make the trip from Canterbury, health permitting.

What is being commemorated at Western Reserve is the Shakers' own discovery of America. The sect traces its lineage back through the Quakers to the Camisards, a Protestant group who, after the revocation of the Edict of Nantes in 1685, foretold the coming of God's Kingdom. In the spring of 1774 Ann Lee, leader of the group in England, decided she had had enough of being stoned, beaten and jailed for preachings that seemed to smack of witchery, popery or both. The New World, she hoped, would be more tolerant of rites that included trances and dances marked by ecstatic whirling and trembling. She booked passage on the vessel *Mariah* to cross the Atlantic with eight other "Shaking Quakers." One of these was her husband, a blacksmith named Abraham Standerin, to whom Ann Lee had borne four short-lived children.

It was an eventful three-month voyage. The group insisted on doing their dances on deck, which scandalized the skipper. He ordered them to desist on pain of being thrown overboard. But in a violent storm *Mariah* sprang a leak and was about to sink when Ann Lee assured the captain that she had had a vision: An angel had promised her that all hands would come through alive. Whereupon a great wave slammed against the ship, knocking its loose hull planking back in place, and *Mariah* safely rode out the storm, to dock in New York August 6.

While suffering in prison Ann Lee had become convinced that Christ's second coming had already occurred within herself, as it could with anyone who confessed his sins. She also was certain, after a frustrating and fruitless marriage, that sexual intercourse and all lusts of the flesh were the root of most human evil. So when her husband Abraham, being repeatedly refused what he regarded as his conjugal rights, ran off with another woman, Ann felt no great loss.

The American Colonists could not decide: Was Ann Lee, being so recently from England, a Tory spy,

or some kind of religious nut? Or was she really an inspired prophetess who offered—via her succinct motto, "Hands to work and hearts to God"—a pragmatic alternative to the endless, tortuous head-of-a-pin harangues of the all-too-typical Protestant minister? To some she was anathema, but to others she came across as an intense, blue-eyed, not unattractive woman, a little on the short side in physique, very much on the overwhelming side in personality.

In the decade after she arrived in this country Ann Lee was often reviled and bedeviled, and once even abducted in a carriage by ruffians who wanted to see whether or not she was a man after all. Despite such indignities, she traveled doggedly into upstate New York and New England to "open the testimony" and to found what became the earliest Shaker community. Worn out by ill treatment and by her passionate evangelism, she died in 1784 at the end of that decade. Her movement might have died with her, still only shakily formulated, had not the illiterate but blazingly spirited Mother Ann converted a number of hardheaded, well-organized Americans to her cause. Two of these, Father Joseph Meacham and Mother Lucy Wright, took up as a duumvirate where she had left off, and charted the course of the most successful communistic subculture in American history.

Shakerism was codified into four basic principles—virgin purity, peace, justice, love—which were to be expressed in celibate life, open confession of sin, nonresistance, community of goods and universal brotherhood. Equality of the sexes was proclaimed "in all departments of life," two centuries before women's lib, along with equality in labor and property, freedom of speech and (within limits) of thought, the abolition of all slavery—including of course slavery to passion—as well as temperance and the practical living of the Golden Rule.

Guided and goaded by Father Meacham and Mother Wright, Shaker missionaries trudged from the society's first agrarian community at New Lebanon, New York, up to Massachusetts, New Hampshire and Maine, down into Kentucky, out to Ohio—where the Cleveland suburb of Shaker Heights now stands near their long-gone village of North Union. They were persuasive preachers, too. Sometimes their converts joined the fold by ones and twos; at other times entire congregations—pastors, deacons, elders and all—switched faiths to become believers.

Barring virgin births, the notion of a self-perpetuating yet celibate society would be, to say the least, a

Another Sabbathday Lake Shaker, Sister Marie Burgess, 53, knits a pair of mittens.

At Canterbury, Sister Miriam Wall, 78, carries a Shaker cookbook for unadulterated foods.

Mr. Eisenstaedt has been a world-famous photographer ever since his preinvasion coverage of Ethiopia in 1935. Mr. Williams is a veteran writer and editor.

At Canterbury, Sister Ethel Hudson, 78, keeps up with the news. Shaker-built chair hangs overhead—a typical Shaker trait: The traditional pegs get the chair neatly out of the way.

contradiction in terms. But Mother Ann and her successors never had in mind the capture of all mankind. The Shakers envisioned a select community living in, yet withdrawn from, the "regenerating" world—which could always provide an ample source of man and woman power to the sexless sect via adult conversion or child adoption. Theirs was an original concept. There have been many celibate sects and orders—but none except the Shakers ever combined heterosexual virginity with propinquity.

Keeping the faith and keeping the communities in business required the presence and labors of both sexes, as well as the most careful rules of order in the mingling of equal but separate genders. In the Shakers' well-built dwellings and meeting houses, separate doorways and stairways, separate residence floors and "retiring rooms," even separate pews for worship and separate tables for eating, kept men and women apart even while living under the same roofs. It was "contrary to order" for a man and a woman to touch, or be alone together. Even when dancing and marching (p. 42), in the slow- or quick-step movements that came to symbolize the spiritual cycles of Shaker theology, the files of men in blue and women in white shuffled and shook their separate ways.

Some backsliding was to be expected, and a Shaker society was always dismayed when a couple dropped out by eloping. Yet if a boy and girl still wanted to marry after a six-month probationary engagement, they were given food, money and a horse and sent into the world not with curses but with blessings.

Sister Elizabeth Dunn of Sabbathday Lake rests in the community meeting room. She is 59.

Farmers, carpenters, inventors

Barred from procreation, the Shakers sublimated their creative energies in a thousand directions and as a result celibacy, as well as necessity and ingenuity, became a mother of their myriad inventions. As eminently successful farmers, they became the first commercial seedsmen, shipping vegetable and grain seeds all over the world. Their austere but pleasing furniture designs—chairs, footstools, desks, built-ins—have seldom been surpassed in functionalism and purity of line. They invented a circular harrow, a self-acting cheese press, a screw propeller, a device for paring and quartering apples, a wooden clothespin. One legend has it that a sister, watching two brothers sweating over a two-man saw, had a better idea and from it came the first circular saw, which wasted no motion. Set up at Watervliet, New York, and tended by a man and a boy, it did the work of 30 men.

The late Edward Deming Andrews, one of the most thorough researchers into the Shaker past, found that only four of their inventions had ever been patented: a chimney cap, a "wash mill" or washing machine, a metal button affixed to the base of tilting chairs, and a folding pocket stereoscope for viewing pictures in three dimensions. To accept patent royalties, Andrews recorded, would have been to partake of monopolism, and to be less than scrupulously honest in their dealing with the world would have been an affront to their faith. Every barrel or basket of produce that left a village was inspected to make sure that the apples in the middle and bottom layers were as perfect as those on top. And no Shaker-grown seed or herb packet was adulterated with a single grain purchased outside.

It was not unusual for an adult Shaker to be master of a dozen trades, from tailoring and accounting to beekeeping and herb-pressing, or carpentry and distilling. A woman might spend her morning painting window trim, her afternoon tending the sick in the "nurse-shop," all the while taking her monthly turn as housekeeper, cook or laundress. "Temperate" labor was the rule; nobody was overworked and nobody was idle. By working at a variety of tasks, the Shakers found "rest" while avoiding monotony and the feeling of being driven. Theirs was "constant, but never excessive toil," Horace Greeley wrote approvingly after

a day's visit to a village. And this consecration to non-excessive labor, along with distribution of the fruits of that labor to each according to his needs, was a secret of their success.

The Shakers' exotic life-style earned them grudging admiration, as well as envy and scorn. When some of the brothers were drafted for military service in the Civil War, two elders petitioned President Lincoln to exempt the whole of the conscientious-objector sect from fighting. "You ought to be made to fight," Lincoln told them peevishly. "We need regiments of just such men as you." But he granted their claim.

Journalists and novelists, playwrights and satirists found the Shakers' blend of secular and religious zeal a rich source. Sitting in on a service in 1838, Greeley was astonished by what he saw: "At length, what was a measured dance becomes a wild, discordant frenzy; all apparent design or regulation is lost; and grave manhood and gentler girlhood are whirling round and round, two or three in company, then each for him or herself."

Artemus Ward, the 19th-century humorist, was given refuge by a New York state Shaker community one stormy night. He later wrote, "The Shakers is the strangest religious sex I ever met," and he pondered their private world: "Why this jumpin up and singin? This long-weskit bizniss, and this anty-matrimony idee? My friends, you air neat and tidy. Your lands is flowin with milk and honey. Your brooms is fine, and your apple sass is honest. . . . You air honest in your dealins. You air quiet and don't distarb nobody. For all this I givs you credit. But your religion is small pertaters, I must say. You mope away your lives here in single retchidness, and as you air all by yourselves nothing ever conflicts with your pecooler idees, except when Human Nater busts out among you, as I understan she sumtimes do. . . .

Sister Frances Carr of Sabbathday Lake is, at 47, the youngest surviving Shaker.

Eldress Bertha Lindsay, 77, says "hands to work and hearts to God" lead to a long and healthy life.

"The gals among you, sum of which air as slick pieces of caliker as I ever sot eyes on, air sying to place their heds agin weskits which kiver honest, manly harts, while you old heds fool yerselves with the idee that they air fulfillin their mishun here, and air contented. Here you air, all pend up by yerselves, talkin about the sins of a world you don't know nothin of."

It was in the mid-19th century that the Shaker population peaked. Many children, orphaned by the Civil War, were given sanctuary in the villages, to be reared in the Shaker faith and superbly educated in Shaker schools. But the war also ruined the order's lucrative seed business with the South. The increasing industrialization of the country, the population movement from farm to city, the society's tendency to buy more and more farmland and, eventually, to become land-poor, the fading of religious revivalism, the all-too-human financial miscalculations of village leadership —all these contributed to an irreversible decline. One community after another was dissolved and its properties sold, its remaining families moving to still-active villages. From a total membership of about 6,000 in 1850, the society dwindled to about 1,700 in 1900—and after the death in 1960 of Delmer Wilson, the last surviving male member, to a dozen in 1974.

Fountain stone mystery

In the peaceful Shaker museum at Old Chatham, New York, a glass case protects a great marble slab, unearthly looking, mysterious. The monument came from the Shaker settlement at Canterbury and is the only intact "fountain stone" known to exist. At one time a similar slab, bearing a message headed THE WORD OF THE LORD and expertly incised by a stonecutter, stood in a sacred grove atop a "Holy Hill" at each Shaker village. On special occasions men and women from the various "families" or subdivisions of a village would walk in measured nocturnal processions up the Holy Hill for private spiritual services at the fountain stone.

A century ago, concerned about vandalism and public misinterpretation of the Holy Hill rites, the leaders of the sect directed each village to "take care of" its fountain stone. Some were broken up and the fragments scattered; others were buried in secret. A large fragment of the stone from New Lebanon stands outdoors at Old Chatham, between two sturdy, tapered granite gateposts.

No one knows where the fountain stones from Hancock, Massachusetts, or Sabbathday Lake, Maine, may be—or why the Lebanon stone was not taken care of. As for the stone from the dissolved society at Alfred, Maine, Sister Mildred Barker, a trustee of the eight Sabbathday Lake Shakers, says, "I am the only one

Sister Minnie Green, 63, lives in the community at Sabbathday Lake.

who knows where it is buried—and when I die, no one will know."

"Taking care" of the fountain stones was one of many expedient compromises the Shakers resorted to as the world turned and as the society itself changed. At one time it was "contrary to order" to elevate an animal to humanistic status by making a pet of it; today dogs are fondly treated mascots both at Canterbury and at Sabbathday Lake. At one time interior walls had to be unadorned; today photographic portraits of deceased brothers and sisters hang on the walls at both villages. Dancing and shaking, as well as faith healing, went out of style long ago. So did "smoaking," though to hear the still-living Shakers tell it, Shaker sisters had greater pangs of withdrawal in giving up their clay pipes than the menfolk had in swearing off tobacco. The society never did seek to cut itself off from communication with the world, and nowadays the sisters are—according to their tastes—faithful followers of everything from print journalism to Walter Cronkite, "Upstairs, Downstairs," and "Hogan's Heroes." But they have never deviated from the important things—virgin purity, peace, justice, love.

Nor from their devotion to industry. At Canterbury, once a beehive of hand-knitting that produced thousands of collegiate "Shaker Sweaters" a year, Eldress Bertha Lindsay still takes her turn, at age 77, as cook and baker, turning out among other things delectable apple pie flavored with authentic Shaker rose water. (It was Bertha who led her group on the visit to the Renwick exhibition in Washington, where they stayed, she recalls impishly, at the Watergate apartment complex.) The Canterbury sisters still sell Shaker chairs and other furniture in do-it-yourself kits, made under a licensing agreement at nearby Concord.

Likewise the Sabbathday Lake sisters. They still market, quite successfully, their canistered herbs, spices and rose-hip tea. (They are pleased to note that their establishment is the largest single taxpayer in the town of New Gloucester and that seldom have societies claimed tax exemption. Even when granted exemption, societies volunteered to pay a certain amount anyway.) Sister Mildred Barker, also 77, plays the portable organ at services each Sunday morning. Her favorite hymn is "Progress," from an 1884 Shaker hymnal: "I must live, must have my being; Faith & conscience must be free; Deeper, wider, broader, higher, Ev'ry act and feeling be. Creeds and forms do but oppress me. . . ."

Both of the surviving communities, at Canterbury and at Sabbathday Lake, are lovely, well-ordered agrarian villages where brick dwellings, the products of Shaker kilns, and immaculate white clapboard barns and shop buildings nestle among rolling orchards and pastures. Both depend on male and female civilians to keep them going, for four sisters in one village and eight in another could not possibly maintain the real estate and enterprises the society owns. At both villages, the sisters' dresses—prints, checks, even solid scarlet—are "caped" with a fore-and-aft rounded bib that masks the bosom. The two remnant communities do, however, differ on minor details. The sisters in Maine still say "yea" and "nay"; those in New Hampshire say yes and no. The only sister at Sabbathday Lake who customarily wears the traditional starched lawn cap is Sister Mildred; all the sisters at Canterbury wear it and speak of having "put on the cap" in their teens in preparation for "signing the covenant" at 21. More important, some years ago the parent church at Canterbury decided that in all realism, Shaker membership had to be closed. Some members of the village at Sabbathday Lake feel that the ruling was unwise and would prefer that, in theory at least, new members, male or female, be admitted.

Both outposts contain Shaker museums—and at both the sisters resent being categorized as museum pieces, gawked at and Polaroided in the tourist season, because they feel very much alive. As the youngest of them, Sister Frances Carr, 47, puts it: "I think some people wish we would just pass away, so they could say what they wished about Shakerism without fear of contradiction from us. Other people show a more genuine concern. Ten years ago, people came to Sabbathday with an interest in our antique chairs and gadgets. Now, people come with an interest in the Shaker way.

"We'll go away in time, as will everybody. But our ideas and our way of work will never go away."

In the restored village of Hancock, empty Shaker chairs presage the probable end of the sect. Everything is in place.

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"Stopping by Woods on a Snowy Evening"

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31-86

Photographs by Ernst Haas

Bhutan's king takes over: history with its eye on the future

The last of the 'Forbidden Kingdoms' opens its doors on a spectacular occasion, to a few foreigners and to the 20th century

At 9:10 on the morning of June 2, 1974—the precise moment that astrologers had determined to be the most auspicious—Jigme Singye Wangchuck placed a multicolored scarf around his neck and thus became the world's only teen-age absolute monarch.

This crownless coronation took place in Thimphu, the capital of the little Himalayan kingdom of Bhutan, and it was not the 18-year-old king's first. That had been a simple ceremony in 1972 immediately after the death of his father, King Jigme Dorji Wangchuck, of a heart attack at the age of 44. And last May, in what was considered the true coronation, the king had donned the scarf in private in the former capital of Punakha in the presence of the chief lama, the Je Khenpo, the only other person whose hands are allowed to touch it.

But this was the public coronation, and Bhutan made the most of it. More than 150 foreign dignitaries were invited, including the U.S. Ambassador to India: a thousand craftsmen had been brought from the four corners of the kingdom to construct Western-style guesthouses and other new buildings, and to refurbish the old; new uniforms had been tailored for all the public officials out of handsome hand-loomed Bhuta-

Dancers with handbells file past a row of lamas in miterlike red hats, while musicians on palace roof wait to announce King's arrival with a fanfare.

A provincial delegation joins monks and dancers in the coronation procession to the palace.

Lamas from hundreds of monasteries scattered throughout the country

nese fabric; lamas had moved up into the mountains around Thimphu to perform religious rites to insure good weather; every schoolboy with a knowledge of English was brought to the capital to serve the guests; lavish banquets were laid on, with delicacies brought up from India and specially fattened local trout; and a three-day program of timeless ceremony, spectacle, dances, songs and athletic events was carried out. The estimated cost was about $5 million.

This is all the more remarkable because Bhutan is a country of only 1.1 million people, most of them farmers or monks, and an annual budget of less than $20 million; a country where, in the words of a government publication, until about 15 years ago "there had been no wheel other than the continuously turning prayer wheel"; and a country that, until the day before yesterday, virtually excluded all foreigners.

One of the three "Forbidden Kingdoms" (Nepal and Sikkim are the others) stretched along the ridgepole of Asia, it comes the closest—in an overworked description—to being a "real-life Shangri-La." The towering mountains, secluded valleys, jungle orchids and alpine poppies (including a *blue* one), age-old lamaseries and above all, the isolation, probably make the comparison inevitable.

The Bhutanese know their country as Druk Yul, "Land of the Dragon," and their ruler as the Druk Gyalpo, the "Dragon King" (it was reported in the

march in the procession, carrying tall insignia indicating their districts.

These male dancers in elaborately draped skirts later performed in the palace courtyard (pp. 58-59).

press that in a burst of coronation euphoria, a Thimphu shop changed its name to the Druk Store). Not much is known about the early history of Bhutan because such records as there were have mostly been destroyed by fires, floods and earthquakes. But by the eighth century A.D. it seems to have been, if not politically united, at least an independent entity. About this time a revered Indian guru, Padmasambhava, came over the mountains and introduced Buddhism, which eventually replaced the primitive religions with their witchcraft and sorcery, although vestiges of them still remain.

Today, Buddhism in its several varieties permeates everything. The most impressive buildings in the country are the great dzongs—combination monasteries, schools, fortresses and administrative centers. The Tashichhodzong in the capital of Thimphu is not only the seat of government, housing departmental offices and the throne room, but it is also the home of almost a thousand lamas.

The ruling house of Wangchuck has been in power only since 1907, and the first two kings continued the ancient policy of isolation.

One of the world's most imaginative photographers, Mr. Haas' most recent book is The Creation. *Early in 1975,* National Geographic *will publish his photographs of Tibetan refugees living in India.*

Three days after his coronation, the king and his beguiling 20-year-old sister, Princess Dechhen

The present king's father, Jigme Dorji Wangchuck, came to the throne in 1952. By that time the Chinese Communists were well into their takeover of Tibet, Bhutan's neighbor to the north, and King Jigme Dorji realized that isolation had its perils. He began a careful program of modernizing the country and opening it up to influences from India to the south and from the outside world. One of his most important steps was to start building a 127-mile road, with the help of Indian engineers, from Phuntsholing on the border to Thimphu. By 1962 it was a jeepable semipermanent road, and it has since been widened and improved for heavy traffic. What was once a five-to-seven-day journey by mule, pony and foot, and a dangerous one at that, now takes six hours by car. And with the opening of an airstrip outside the capital, it takes only 30 minutes by plane from West Bengal.

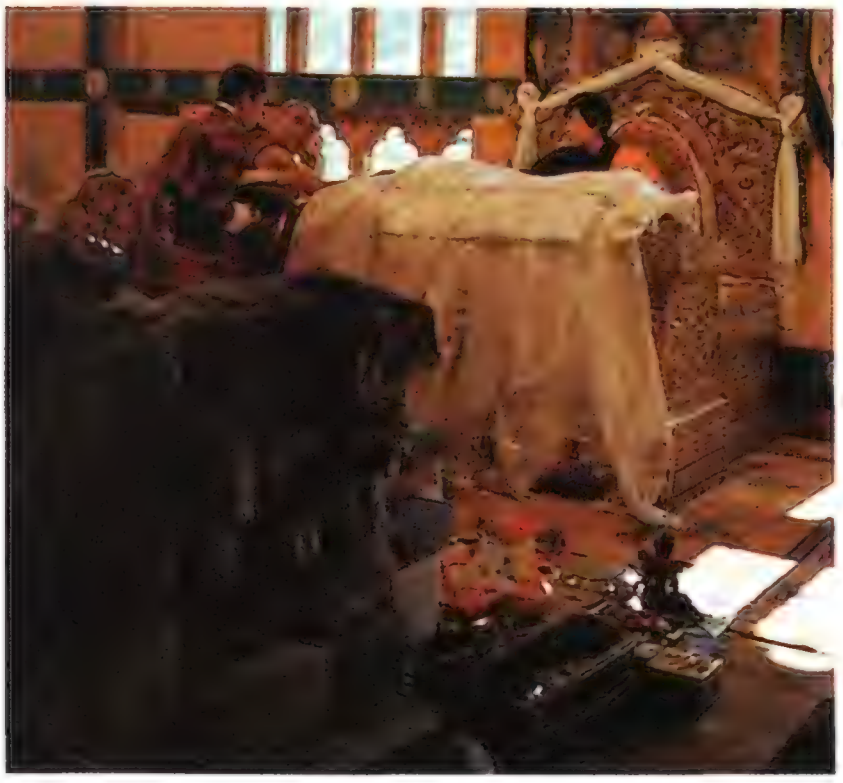
Twentieth-century influences began seeping in, but young Bhutanese also began going out—to attend school not only in India but in England, Australia and the United States. The new young king had part of his education in India and part of it at the Heatherdown Public School in England, but in 1971 his father called him home so that he could personally instruct him in the traditional ways of his country and in his plans for its development.

Today the Druk Gyalpo's hair is long and modishly brushed across his forehead (above right), though his father wore his à la Yul Brynner—a measure of how things have changed. He listens to recordings of the Rolling Stones and other rock groups with his friends, and sports are a major interest. He is expert at archery, the traditional sport of Bhutan, but is also the star goalie of the local soccer team. And during a post-coronation basketball game with a Sikh team from India, he rushed in and took the ball when he saw his own team losing (p. 63). Too late: The Sikhs won.

Guests came bearing gifts. Two magnificent pairs of elephant tusks are from an Indian maharaja.

Wangmo, invited the visiting journalists to tea. He handled their questions deftly, in fluent English.

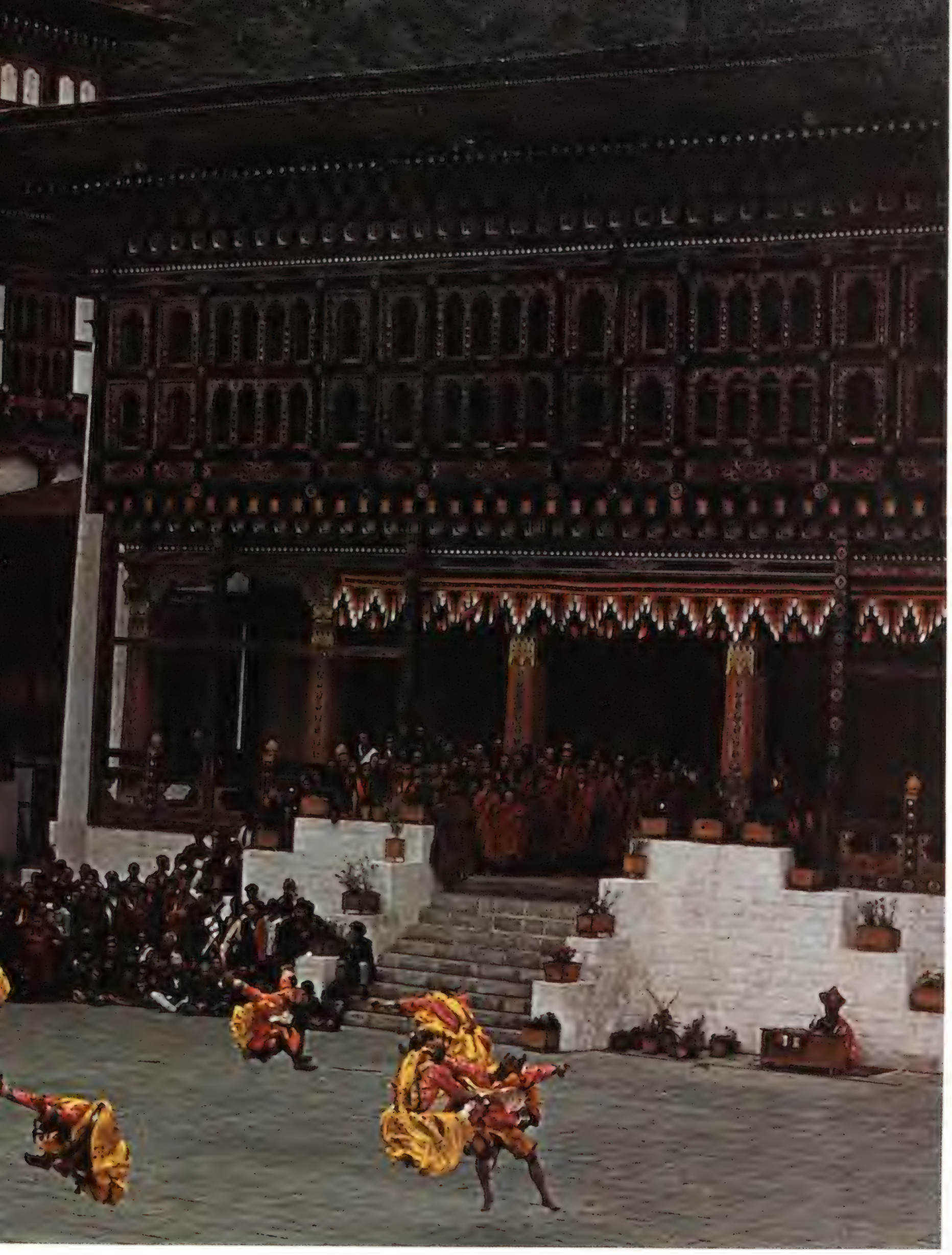
Queen Mother Ashi Kesang Wangchuk is a cousin of the ruler of Sikkim, who married Hope Cooke.



In the throne room, each guest bowed and each gave the king a silk scarf as a symbol of respect.

Colored bags of rice, gifts of the monasteries, will later be distributed among the people.

While the coronation ceremony was going on inside the Tashichhodzong, the seat of government, dancers performed in the courtyard. At the spectacular climax, they all leaped high into the air in unison.



For all these modern touches, his coronation was nevertheless planned to emphasize the long, continuous tradition of Bhutanese faith and practices. Lamas banged on drums and sounded blasts on ten-foot trumpets. Delegations from throughout the country came in brand-new but traditional costumes to sing their regional songs and perform their regional dances. The official dance companies gave virtuoso performances to ancient rhythms and patterns. And though the king's young associates wear American jeans most of the time, they were in the traditional wraparound *bakhu* for the coronation.

Not everything went according to plan. A few days before the coronation the government announced that it had discovered a plot to assassinate the king and take over the country. This was officially ascribed to Tibetan refugees who wanted to use Bhutan as a base for mounting attacks against the Chinese in Tibet, but it was also said that a mistress of the late king wanted the throne for her own son. Politics in Bhutan are devious, and there are plenty of rivalries, so the years ahead may not be easy for the new Druk Gyalpo.

Although absolute in theory, his power is slightly circumscribed by the reforms begun by his late father. King Jigme Dorji Wangchuck established a National Assembly in 1953 and delegated some of his powers to it. At present it consists of 150 members: 100 elected members representing the people, 10 elected by the monasteries and 40 nominated by the government. The National Assembly passes laws, approves senior appointments, and advises on "matters of national and international importance." Nevertheless, according to constitutional law and practice, the king is the supreme authority (although he looks to India for guidance on foreign affairs).

This authority extends over an area about the size of Vermont and New Hampshire combined, where

Tanka depicts Indian guru Padmasambhava, who brought Buddhism to Bhutan in eighth century A.D.

During the ritual dances, attendant at prayer table received offerings to the gods in silver bowls.

At Changlimithang Stadium, masked lama dancers personify the demons who protect the Buddhist faith.

until a dozen years ago there was no electricity, no postal system, no modern schools and no hospitals. On the other hand, as the king points out, "We have no population problem. We don't have the gap between rich and poor that you find in other countries." But with a population density of only 56 persons per square mile, it also lacks the labor force necessary to carry out the projected modernization programs.

He seems to be aware of this, and of the major problems that he faces. In a speech to the people on the day after the coronation, he said: "From year to year Bhutan is receiving increasing financial and technical assistance from many countries: among them we have received the greatest assistance from our good friend India. Although the process of socioeconomic development was initiated in our country only a few short years ago, we have achieved tremendous progress within a short span of time. In spite of this progress, our present internal revenues cannot meet even a fraction of our Government expenditure. Therefore, the most important task before us at present is to achieve economic self-reliance in the near future."

Most observers who know Bhutan think it will take much longer than that. Though increasingly better educated, many of his close advisers and aides are very young. His eldest sister, the 21-year-old Princess Sonam Chhoden, is the king's special representative in the Finance Ministry, and the next eldest, Princess Dechhen Wangmo (p. 56), is his special representative in the Development Ministry. But he is also expected to rely on the politically very experienced Queen Mother.

In addition to applying for increased assistance from foreign countries and the United Nations, Bhutan—learning from the experience of other developing countries—will begin next year to let in tourists, but on a modest scale and only to the degree that facilities exist for taking care of them. There is already some evidence of the changes they will bring. Along with the rock records and flared pants, today's argot has penetrated the once-Forbidden Kingdom. A *New York Times* correspondent asked a young Bhutanese official in his traditional *bakhu* and sword whether he would like to go to the United States.

"No way," he replied. "You need bread for that."

Athletic king enters archery contest (above) and basketball game with Sikh team from India (opposite).

Daniel Patrick Moynihan (left), U.S. Ambassador to India, leaves the palace after receiving decoration.

Photographs and text by J. S. Bainbridge, jr. and Peter C. H. Pritchard

The world's largest sea turtles remain a reptilian mystery

What little we know about leatherbacks sets them apart from all other species. Their half-ton size is just the beginning

J. S. Bainbridge is a reporter for the Baltimore Sun; *Peter Pritchard is a biologist who has studied turtles for the World Wildlife Fund.*

A leatherback turtle emerging from a phosphorescent surf on a tropical beach (above) is an awesome creature that escaped nature's pogrom of the dinosaurs. It is by far the largest turtle in the world, outweighing the most ponderous of the giant Galápagos tortoises by several hundred pounds. The average weight of the leatherbacks nesting in French Guiana, where we tried to weigh them, is about 800 pounds; the biggest probably weigh up to 1,300 pounds.

No accurate surveys have been made because hoisting these creatures on scales in the field is a monumental task. We brought with us a spring-pulley scale and tried to haul a couple of average-looking leatherbacks up on a tripod system made from freshly cut saplings. But each time the rope broke before the turtle was lifted even partly off the sand.

We had come to French Guiana under the auspices of the World Wildlife Fund to tag, measure and study as many leatherbacks as possible during a few weeks of summer. It wasn't until 1968 that Pritchard discovered this remarkable stretch of beach as a major nesting site for these turtles. Starting in 1969, he led tagging groups which camped on the beach each summer for several weeks to mark and record turtles. This beach is now considered the single most important known nesting site for the leatherback.

Ninety miles northwest of Devils Island, on the

border with Surinam, the beach is a desolate area separated from the mainland by the Mana River and a swamped stretch of what was formerly a forest. There are sections where trees and shrubs grow thick. Other stretches are sand dotted with massive dead mangrove roots. An hour's walk from camp was a narrow section of beach, three to four miles long, protected on the seaward side by a tight barrier of these roots washed up by the surf.

On the landward side of this stretch the swamp comes closer to the beach than anywhere else. At most, this area is 75 feet wide. The entire length of this section is studded with erect, limbless tree corpses. During high tides at night, the waves would break through the driftwood and spill over the sand spit, making whoever was on his nightly tagging journey feel very much at the sea's mercy. Aggressive little red crabs would emerge to challenge the presence of humans. If we stepped too close to where one was resting, a painful nip would result. In the dark the crabs were indistinguishable from the omnipresent wood chips until they moved.

Split into teams, we shared the tagging responsibility by alternating nights of turtle duty. We covered nearly 30 miles of beach (12 to 15 miles out and back) each night in search of female turtles coming ashore to lay their eggs.

All the work was done at night, since turtles are even more sensitive to the tropical sun than humans are and nest only in the dark. As our eyes grew accustomed to our nocturnal habits, we learned to distinguish at long distances the shape of an emerging leatherback from the many pieces of rounded driftwood that moved through the surf.

It is strange to walk along one of the world's most remote beaches and think of this little-known reptile as a creature threatened by man. But the leatherback is on the endangered species list. Present estimates put the world population of leatherbacks at between 30,000 and 40,000 nesting females, of which fully one-half use the French Guiana beach, and an undetermined number of males.

Until fairly recently, Trengganu beach in Malaysia was considered the major nesting ground. But when the French Guiana beach was revealed as the most important site, Trengganu had to be satisfied with claiming only one-sixth of the world's population. In French Guiana the nesting is so thick that in late season about one out of every five turtles digs up an earlier nest constructing its own. Despite this seeming overpopulation, leatherbacks are among the rarest of sea turtles, second in scarcity only to the Kemp's ridley turtle (SMITHSONIAN, August 1974, p. 6). Though they roam most of the world's oceans, their nesting concen-

trations are few and cover only small geographic areas. The leatherback's potentially precarious situation has spurred efforts to study and protect what Archie Carr, the University of Florida turtle authority, has called "this extraordinary turtle, one of the most remarkable of all living reptiles."

The leatherback, as its name implies, is immediately distinguished by its shell. Instead of having a hard carapace composed of separate plates like other sea turtles, the leatherback has a leathery exterior with seven bony ridges running the length of its back and five along its belly. Imbedded in its skin is a mosaic of small, flat bones forming a hard, inner casing that, together with a layer of oily cartilage sometimes as much as two inches thick, helps do the job of a shell. The leatherback's coloration is also quite distinctive—flippers, head and back are a gray-black, irregularly spotted with small, whitish blotches.

There are many reasons why the leatherback is considered unique. Fragmentary evidence suggests that it wanders farther in the oceans and can tolerate greater variations in water temperature than other sea turtles. Its jaw construction is amazingly fragile—hard-shelled organisms that other sea turtles crush easily, mollusks and crustaceans, could injure a leatherback. Lacking the massive construction and crushing plates of the other sea turtles, leatherbacks seem to rely almost exclusively on a diet of jellyfish.

The leatherback's skeleton is oddly immature. It has large amounts of cartilage at the ends of the bones, thereby theoretically possessing a potential for unlimited growth. Its skull is also a complex conglomeration of small bones which disassemble completely after the flesh is removed. Numerous additional characteristics separate the leatherback from its better-known cousins. Some herpetologists believe that the leatherback deserves a suborder of its own; they refer to it as "the fly in the ointment of turtle classification."

The leatherback is also alone in that it does not live long in captivity. P.E.P. Deraniyagala in Ceylon was able to keep a hatchling alive for two years back in the 1930s; at the Miami Seaquarium a young leatherback had reached 13 months by August. Leatherbacks usually bang their noses against the sides of any tank in which they are put until they die of head injuries. Even in death, the leatherback doesn't fit into human systems. Because its whole body is suffused with oil which is difficult to remove, even "dry" preserved specimens in museums drip for years and eventually have to be discarded.

Leatherbacks encounter as many hazards on their natural forays ashore as they do in aquariums. On our tagging journeys through the area of lifeless trees, swamp and mangrove barrier, a section we called the "dead forest," we would rarely find nesting leatherbacks. Turtles are usually unable to penetrate the driftwood and have to pass along to where the barrier breaks up into a better nesting area. At two or three places, however, the driftwood opens up a passage just wide enough for the odd turtle to crawl through.

But turtles don't follow their own tracks back—their

This turtle could feel the spray of breaking waves as it died of dehydration, trapped in driftwood.

Left: Dead trees and driftwood impose a deadly barrier to turtles trying to come ashore to lay their eggs.

guidance systems on land seem to be limited to locating the general direction of the sea. So when a leatherback unlucky enough to penetrate the barrier finishes nesting, she turns to the sea only to run again into the driftwood. This time she probably will not make it through. On several occasions we found leatherbacks dead from exhaustion and exposure after having pulled their enormous weights hundreds of yards along the beach in a desperate search for another opening. These unfortunate creatures were close enough to have felt the spray of the surf yet were unable to reach the sea.

Sometimes we would find live turtles vainly flopping about on the land side of the barrier. Many of these we were able to guide back to the sea by waving a flashlight from the direction we wished them to take. Leatherbacks seem to follow a light source instinctively. But many turtles were beyond our help, either because they were already hopelessly entangled or because a suitable opening in the barrier was too far away for them in their weakened conditions.

A leatherback cannot reverse its direction; it is committed to forward movement, though some turning is possible. Thus if a leatherback runs solidly into a recess in a firm barrier, it may not be able to extricate itself. Once we found a dead leatherback wedged in a solitary driftwood tree. One of the tree's limbs had funneled the turtle towards the trunk, and she was unable to get out. When the tide rose later that night, she drowned.

Leatherbacks seem unaware of the nature of land obstacles. One night we came across a leatherback emerging from the sea. We remarked how much she looked like a small Volkswagen puttering back from a trip on the ocean floor. Rather than tag her then, we decided to wait until she moved inland a bit, since leatherbacks tend to be active when they're fresh from the sea and can deliver a good whack with their powerful flippers while being tagged. We sat down where we thought the turtle might be headed and relaxed. Our dozing was abruptly interrupted by the turtle's gulping breath not five feet in front of us. We jumped out of the reach of her eight-foot flipper span, while she continued to heave herself forward. One night the tagging project was paid a visit by a leatherback that crashed right through the camp, flattening pots and pans in the process.

Nesting leatherbacks in French Guiana and ad-

Author Bainbridge, flashlight in mouth, tries to punch a tag through a leatherback's flipper.

joining Surinam face danger from more than just immovable objects. Occasional jaguars patrol the beaches. Deep scratches on the heads and backs of the turtles are common. Despite their size, leatherbacks are sometimes killed by the big cats, though it appears that most are attacked just as they leave the sea and are able to escape to the safety of the water. Only the largest predators threaten the leatherback in the ocean. Quite often a turtle will be found with part or all of a flipper bitten off by sharks. Leatherback remains turned up in the stomachs of three killer whales caught off St. Vincent in the West Indies.

During the nights, when the turtles come ashore to nest, we would tag anywhere from 10 to 80 of them. In peak months of previous seasons, up to 140 turtles were tagged each night. Estimating that we tagged maybe a third to a half of the turtles nesting on any given night, one can see how many leatherbacks use that stretch of beach.

To tag a turtle, one has to wait until the animal takes one of its short, periodic breaks in its trek on the beach. Then a small metal tag is put through the loose skin on the hind part of one of her swimming flippers near the body. The tagger must then move quickly away from the leatherback since she will usually kick up a fuss, and there is no way to subdue one of those huge flippers alone. Ducking out of the way got increasingly difficult later in the season as the plierlike tagging devices got clogged with sand. Sometimes they had to be pulled apart or else they would stay with the turtle. More than once we had to chase a leatherback into the surf in order to retrieve our tagging tools, then continue tagging, wet and a little bruised, with our pliers a little more gummed up.

A leatherback tagged while actually laying eggs reacts very little. The tagging does no damage to the turtle. Even if the small wound does bleed, the leatherback possesses the peculiar ability to shut off the flow of blood to an extremity until some healing occurs.

The leatherback apparently nests in alternate years, though the validity of any absolute statement is far from certain. Where they come from or where they go after nesting no one knows for sure. One can assume that the leatherback travels far. The first tag return came from a turtle, tagged in 1970 across the Maroni River in Surinam, that turned up off the coast of Ghana, West Africa, in 1971.

From French Guiana, we have had four recoveries away from the beach. One was found off Beaufort County, South Carolina, in a shrimp net. Another was caught southeast of Freeport, Texas, but was later released. Two of the turtles tagged in 1972 showed up in 1973. One was caught in a net 15 miles from Isla Aguada, Mexico, two-and-a-half miles from the coast and 15 fathoms deep; the other got tangled in lobster lines off Monmouth County, New Jersey, in September 1973. Although the Malaysians have tagged some 6,000 leatherbacks, they have had no returns.

All sea turtles use navigational techniques that are still not understood by scientists. Perhaps some of our tag returns will aid in understanding how these reptiles can travel 3,000 miles or more in the open ocean and yet return to nest on the same small beach time and time again. On the beach we find many turtles we have tagged in previous years coming back to nest once more.

The only detailed studies of the leatherback's habits have been done when the female nests. Many times each night we would encounter leatherbacks making

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Nesting complete, a turtle heaves itself back toward the sea, a world to which it is supremely adapted.

their nests. Our approach made little difference to the turtles, and they would go about their duty without even acknowledging our presence.

A leatherback prepares the beach for nesting by first making great sweeps with her front flippers. The leatherback excavates a pit two to three yards wide, according to the span of her flippers. Sand is thrown onto her back, blending the animal with the beach. We generally avoided trying to tag the turtles directly from behind since it was not difficult to get a flipper full of sand forced into our mouths.

Once the basic pit is finished, the smaller, hind flippers go to work, delicately digging the egg cavity. She cups her hind flippers, gently lifts the loose sand out of the nest, and dumps it at her sides. The dexterity of these small flippers is amazing, especially since the turtle can't possibly see what she is doing.

When finished, the nest will have a bell-shaped cavity two to three feet deep into which the turtle will drop several dozen soft-shelled eggs (the average clutch in French Guiana numbered 86 eggs). Another peculiarity of the leatherback is that its normal eggs are always accompanied by a number of small, yolkless eggs. This has not yet been adequately explained.

After the laying is finished, she will cover the egg cavity with sand pushed in by her hind flippers. Her broad swimming flippers will finish the job by once again sweeping the sand, moving around as she does, to obscure the exact location of the nest. Soon the nest is completely hidden.

Frustration for egg hunters

When egg-eating animals come upon a leatherback in the final stage of nesting, the location of the cavity is obscured so well that they usually are unable to find any eggs. Deraniyagala reports watching a monitor lizard that dug three fruitless holes searching for eggs in a fresh leatherback nest. Finally the hungry lizard gave up and went off to hunt easier prey. The aroma of seven dozen fresh eggs is masked by the fishy smell of the mother turtle, which permeates the sand.

The whole nesting process takes about two hours. After it is completed, the turtle wearily heads for the water. When the waves begin to touch her, the leatherback's energy is renewed. Leatherbacks, so heavy and clumsy on land, are perfectly adapted to the marine environment. Flippers that flopped about on shore move in the water with a smooth style that, as herpetologist Raymond Ditmars put it, "recalls the flight of a hawk."

Their life in the water remains a mystery. Other sea turtles are found regularly in offshore feeding grounds. The leatherback just disappears. Many things lead us to believe that this turtle lives in the open ocean. It

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is well adapted to eating cold-water jellyfish that float with the ocean currents. Its flippers are proportionately much larger than those of the other sea turtles, enabling it to make faster swims over longer distances. The softness of its skin and its lack of horny shell plates suggest that it does not have to contend with rocks or coral. And the fact that open-ocean obstacles are few may suggest a reason why the leatherback has such problems with them on land. Carr calls the leatherback "the most aquatic of all turtles and, indeed, the most completely pelagic of modern reptiles except sea snakes or, perhaps, the Loch Ness Monster."

After two months in the egg, a group effort of kicking and flailing brings the hatchlings to the surface of the sand. Occasionally, while walking the beach in the twilight, we would run across a clutch of hatchlings making a break from their nest. Sometimes it would happen just as the mass of babies broke through the sand, as if the beach itself were giving birth. We would see a complex, twisting mass of flippers and straining heads until one and then another hatchling broke loose to begin its seaward journey.

Leatherback hatchlings then make tight, 360-degree "orientation circles" peculiar to the species. From there it is all individual effort to reach the sea, each baby turtle scurrying as fast as it can. Many nests aren't even given the chance to produce hatchlings. Raccoons and crabs do find some clutches. It is also surprisingly common for a nest to be built too close to the sea, so that the tide washes over it. Every day we would see nests exposed by the tide's erosion. The eggs would be scattered and consumed by vultures.

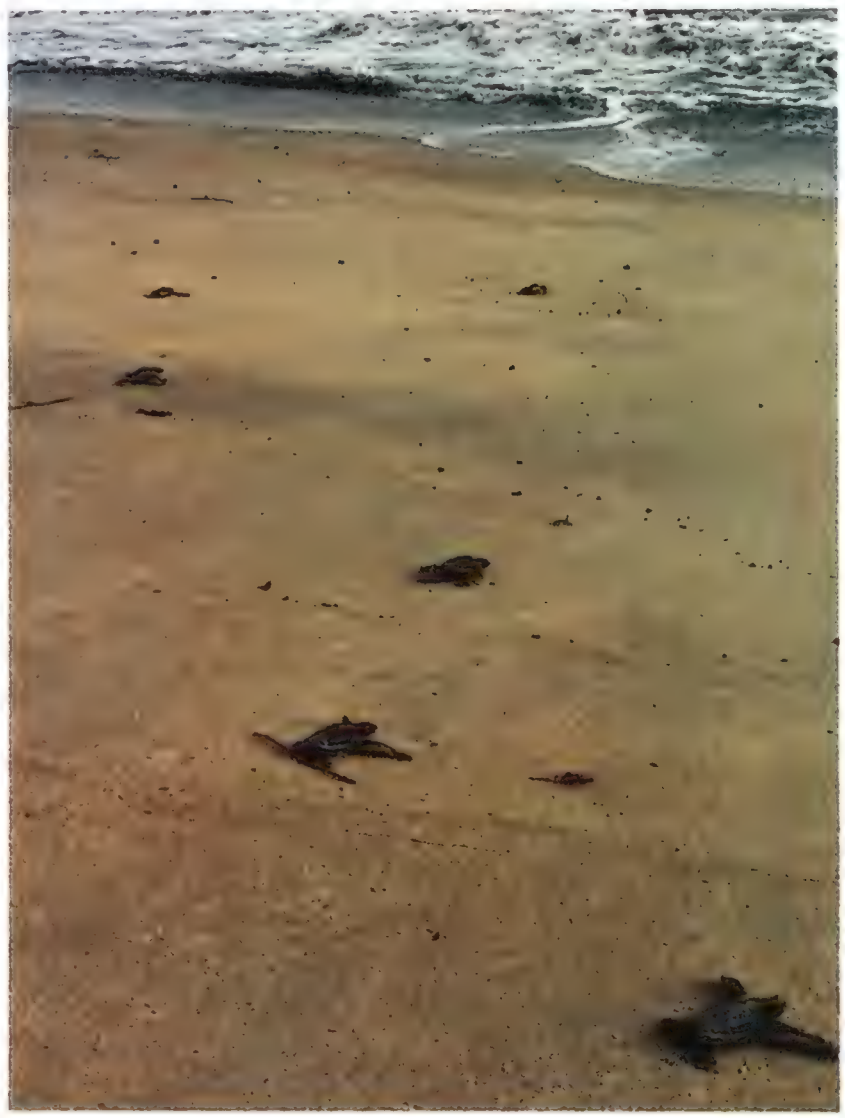
Hatchlings run a gauntlet

If a hatchling does make it to the beach surface, it must contend with milky-colored ghost crabs that attack the little turtles on their way to the sea. If they are unfortunate enough to emerge when it is still light, the vultures will destroy virtually the entire clutch. When the hatchlings finally get to the water, they run the risk of being eaten by fish. The sharks that cruise within a few feet of shore relish turtle meat.

But nature has taken care of the predation problem by having the mother leatherback lay many eggs, not just once, but as many as eight times per season, 9 to 13 days between nestings. When the successful hatchlings disappear in the surf, the young females don't return until their size has increased many, many times. The males never return.

Students of sea turtles are waiting for someone to devise a system whereby a hatchling can be successfully tagged. A tag must be small enough not to impede the swimming of the baby turtle, and at the same time sturdy enough to survive storms at sea, erosion and the phenomenal growth of the turtle. It must also be large enough to contain information for whoever finds the turtle. When the problems of tagging hatchlings are solved, it is hoped that many questions will be answered. Do hatchlings return to their natal beaches to nest as adults? How old are they when they first nest? Indeed—how old do they get?

One thing is sure: The cycle of the leatherback sea turtle has worked successfully since long before the human species was under consideration. So far, the leatherback has not suffered serious damage from humans. Though concerted egg hunting annually decimates clutches on the Malaysian beaches, the French Guiana site is more remote. Man has not yet decided that the leatherback itself is worth exploiting commercially, despite the fact that in Ceylon the turtle's abundant oil has some value as a canoe varnish. But the increase in oceanic pollution and the encroachment of egg hunters and civilization on the nesting grounds constitute a potential threat to the leatherback's survival. Man may yet drive this strange giant into extinction before he really knows much about it.



Opposite: A young leatherback, here almost four times life size, struggles to get clear of its shell. Once free, hatchlings must elude crabs and vultures as they scramble to the water, above. The sharks are waiting.

By Ralph K. Andrist

Alas, poor George, where is your head?

Tumbled to the ground in 1776, the king's leaden image was hacked apart and toted away. Mysteriously, much of it is still missing

Louis Miller used to own and operate an antiques-and-old-things shop on the edge of Norwalk in southwestern Connecticut, the kind of store where you find fine pieces of old furniture intermixed with world's fair medals and bottle-glass insulators. Perhaps it was daily contact with the old and venerable that fostered his interest in local history—or at least one aspect of it; in any event, one Saturday afternoon in October 1972, he put his metal detector in his car and drove three or four miles north into the neighboring town of Wilton. There, well off any road, in a swamp almost dry at that season, Miller began making sweeps with the detector. The device chirped two or three times, then gave off an unmistakable signal. About eight inches below the surface Miller's fingers met something that he described as feeling "soft," although it was clearly metal.

Carefully unearthing the object, he found himself with a chunk of lead, gilded on one side and weighing about 20 pounds. Lou Miller was quite certain that he had found what he had come looking for, but he compared his piece with two similar ones in Wilton. There was no doubt: He had discovered another piece of the statue of King George III which had been destroyed in New York in 1776.

The story of how a piece of a statue of a king of England got from Revolutionary Manhattan to a present-day swamp in Wilton, Connecticut, has become somewhat murky, but the outline is clear enough. It started with the repeal of the Stamp Act in March 1766. The Colonists were deeply grateful to William Pitt the Elder, who had been instrumental in getting the Act repealed. New York City proposed to erect a statue to Pitt, and soon money was being raised for that purpose. But the New Yorkers were shortly reminded that it would hardly be politic to put up a statue to Pitt while neglecting their gracious sovereign, George III. So they found themselves forced also to erect *his* statue.

Both statues were made in England by Joseph Wilton, a widely known sculptor of the time, and both arrived in Manhattan on the same ship in 1770. In depicting the king, Wilton had closely copied the equestrian statue of Marcus Aurelius in Rome. George,

Courtesy New-York Historical Society

larger than life-size, bestrode his horse clad in the robes of a Roman emperor, scepter in hand, laurel wreath on head. Horse and rider were made of lead and covered with gold leaf. The statue was erected on Bowling Green near the tip of Manhattan, with the aid of toasts, band music and the firing of "32 Pieces of Cannon from the Battery."

Wilton had wrought Pitt more modestly, but had also depicted him after Roman models. The statue of the statesman was of white marble; Pitt was afoot, a scroll in one hand, the other outstretched, as though speaking, presumably against the Stamp Act. It was set up in the center of Wall Street.

Nothing untoward seems to have happened until July 9, 1776, the day when news of the Declaration of Independence reached New York. Public reading of the Declaration set off much celebrating, and the statue of George III immediately became a target of the Sons of Liberty, who hauled him down (above).

"Last night the Statue on the Bowling Green representing George Ghewelph alias George Rex was pulled down by the populace," wrote Lieutenant Isaac Bangs of Washington's army. "In it were 4,000 pounds of Lead and a Man undertook to take off 10 oz. of gold from the Superficies, as both Man and Horse were covered with Gold leaf. The Lead we hear is to be run up into musket balls for the use of the Yankees, when it is hoped that the emanations of the Leaden George

will make as deep impressions in the Bodies of some of his red coated and Torie Subjects. . . ."

The head was hacked off and a musket ball fired into it, the nose pounded away and the laurel wreath pried off. When the statue was at last abandoned, the patriots paraded away with the head, probably to prolong their victory celebration among the taverns. They planned to display the head on a stick as the heads of traitors were once exhibited on pikes.

The plan was never carried out. There were many Loyalist informers in New York, and so the story of the purloined head almost immediately reached the British army, where it moved Captain John Montresor to action. Montresor had lived in New York for a number of years and had his contacts. He immediately sent a spy named Corby (or Corbie) to a Tory innkeeper named Cox, and Corby and Cox, by stratagems unrecorded, stole the head of the statue and buried it while the American soldiers were still chortling over their planned triumph. The American army was forced to retreat from Manhattan in November; then, as Captain Montresor wrote, the head "was dug up on our arrival, and I rewarded the men, and sent the Head by the Lady Gage to Lord Townshend in order to convince them at home of the Infamous Disposition of the Ungrateful people of this distressed Country."

Meanwhile, the rest of the statue was cut into manageable pieces and shipped up Long Island Sound to Norwalk, Connecticut, where it was loaded onto farm wagons and hauled some 50 miles north to Litchfield, a developing supply depot for the Continental Army. There General Oliver Wolcott, a signer of the Declaration of Independence, put up a shed in his apple orchard for a bullet-molding foundry.

Wolcott cut up the chunks of statue into pieces small enough for the melting pot, but otherwise the work was done almost entirely by women: Wolcott's two daughters and a Mrs. Marvin and her daughter, with some small assistance from Wolcott's young son and "sundry persons." They must have been sturdy country women, these patriot matrons and girls from up-country Litchfield, for handling the iron ladles and pouring melted lead was no job for a wan and wispy female. After molding the bullets they made them up into cartridges, which involved packaging each bullet in oiled paper with the right amount of powder for a musket charge. General Wolcott's precise records indicate that the crew produced 42,088 cartridges. Something else comes out of Wolcott's records. We know that a pound of lead produced 20 musket bullets. The ladies in the Litchfield apple orchard, then, must have had slightly more than a ton of statue if they were able to produce 42,088 bullets. But the statue had weighed two tons. Even allowing for the missing head, close to half the statue was unaccounted for.

It was more than 50 years before any of it turned up. In the winter of 1832-33, a piece of lead was dug up in a swamp on the property of William Comstock near the old Episcopal Church in Wilton; it was recognized by an elderly resident as part of the statue, and was further identified as a portion of the saddle and saddlecloth. After ten years or so, Comstock sold the piece, and it eventually ended up in New York in the Fifth Ward Museum Hotel of Frank Riley. When Riley died in 1864 and his effects were sold, the piece disappeared and has not been seen since.

In Wilton, legend has it that workmen tearing down "Aunt Nabby" Sloan's old house found a piece or pieces of the statue in the basement. However that may be, it is a fact that in 1871 Peter Coley, who had built a house near the site of the Sloan house, plowed up four large pieces. These chunks, totaling about 200 pounds, were the horse's tail, another section of the saddle, and a couple of pieces of flank or belly. They were sold a few years later to the New-York Historical Society, where they may be seen today. United with them are a small piece given to the Society in 1875, and the marble slab on which the statue had stood. It had been taken to Powles Hook (Jersey City), and in the waning days of the war, suitably incised, used to mark the grave of Major John Smith of the 42nd or Royal Highland Regiment. Later, Major Smith's grave stood in the path of progress in Jersey City. The marker was hauled to Harismus, New Jersey, for use as a stepping stone for a private residence—with the engraved side down, one hopes. It served the same function at a second residence until, in 1874, it was given to the New-York Historical Society.

The site of the Sloan house later yielded yet another

Ralph K. Andrist, a Connecticut free-lance writer, contributes frequently to national magazines.

piece, a small portion of George's toga. This has now moved to Florida with its latest owner. A piece of the raised foreleg of the horse, perhaps 25 pounds, is held by Charles Weitzel of Wilton, who almost melted it down and used it in his trade as a plumber, before he learned what he had inherited. A very small fragment, of less than a pound and a half, is now in the Wilton Historical Society.

As for the head of the statue, it did reach England. Thomas Hutchinson, prewar governor of Massachusetts, noted in his diary that on November 22, 1777, he had called on Lady Townshend in London (Lord Charles had been author of the Townshend Acts which had done much to push the Colonists toward rebellion). He wrote: "Lady Townshend asked me if I had a mind to see an instance of American loyalty? and going to the sopha, uncovered a large gilt head, which at once appeared to be that of the King. . . . The nose is wounded and defaced, but the gilding remains fair, and as it was well executed, it retains a striking likeness." Where the head went after it left the Townshend "sopha" remains a mystery; no one has told of seeing it since.

And what, to digress, became of the statue of Pitt? On November 30, 1776, a few weeks after the British took New York, enemy officers knocked off its head. It also lost an arm, but stood, thus mutilated, until 1787, when Wall Street merchants asked that it be moved out of the traffic. It was removed the next year and put in storage, until eventually acquired by that same Thomas Riley of the Fifth Ward Museum Hotel. But Pitt's statue (right) did not disappear on Riley's death —it was purchased and presented to the New-York Historical Society.

Louis Miller's discovery raises speculation as to how much of George III is still around somewhere. The pieces already accounted for probably total no more than 350 to 400 pounds. The patriot ladies of Litchfield cast 2,100 pounds of the statue into bullets. What of the remaining 1,500 pounds of the two-ton statue? Granting that some pieces undoubtedly have been mangled by bulldozers, buried under concrete roads or in the foundations of Wilton's urban sprawl, many must have escaped destruction.

The chunks of lead already unearthed have one thing in common: They were all found in the Wilton area. But it probably would not be a good idea to hold one's breath waiting for the next discovery. Sometimes 50 or 75 years have gone by with nothing happening. On the other hand, another chunk could appear tomorrow. And there is always the possibility that somewhere in England that missing head will come to light.

William Pitt the Elder, a friend of America, was beheaded by the British occupying New York.

After the hounds have lost the scent—called "throwing up"—riders rest steaming horses and regroup.

Clopping down a misty street at Trim, Ward Union Hunt moves out to the fields to begin the day.

Photographs by Don Carl Steffen

Anachronistic sport is big in Ireland

From autumn until early spring, 'yoicks' rings out over the gorse with a touch of brogue as affluent Irish chase foxes—or something

Mr. Steffen wrote and photographed the article on Khartoum in last January's SMITHSONIAN.

Oscar Wilde described it as "the unspeakable in full pursuit of the uneatable." Robert Surtees' Mr. Jorrocks pointed out that "it's the image of war without its guilt." George Washington participated in it with mindless enthusiasm. Even more devoted was a Briton named John Peel, who, one story says, refused to see his son to his grave because the funeral interfered with it. The son, incidentally, would have understood and agreed with his father's decision. Generations of nature lovers have deplored it; generations of the less affluent have cursed corresponding generations of the more affluent for damaging the countryside with it. It is still done in England, on various baronial estates in Europe and in misty countrysides of Virginia, Maryland, Pennsylvania and other states where pockets of the vastly rich still hold out.

And this absurd anachronism is also evident in, of all places, Ireland. Fox hunting, that is.

To many it may seem strange that the Irish, beset by other passions, should have anything left over for the hunt. But from November well into the spring almost 30 hunt clubs each hold two to four meets a week. Wander around Ireland during the season, and you

Through a hedgerow and onto a field thunder the Galway Blazers, a famous Irish hunt.

Irish practice calls for four feet off the ground when the quarry is sighted.

The spectator contingent of the hunt makes use of every kind of conveyance as they follow.

can get run over by a swarm of hounds and horsemen and motorized hunt followers.

About 11 A.M. each day, somewhere in Ireland, the master of the hunt sounds a staccato series of notes on his horn—this is called "winding" or "doubling"—the pack bays eagerly over a fresh scent and goes careening off across the fields, and after them come men and women, young and old, galloping hell-bent through heather, over stone walls and ditches, up banks, into hedges—50 or so of them, all fanatics. After these horsemen, in turn, come cars, wagons, bikes, even farm tractors. And all of this is for the sake of chasing a gasping little fox, a terrified stag or, more humanely, a slab of carrion which has been dragged across country some time before to leave a scent.

When the Irish mist turns to twilight, the hounds are called in, the followers roar off home and the horsemen straggle back to their local pub, their faces crusted with dried blood from slashing briars (one doesn't wipe off this badge of courage, regarded in Ireland in much the same light as a saber scar at Heidelberg). Some are shouldering a saddle with a broken cinch, some are leading a lame mount, some are even nursing a broken wrist or collar bone. All are thirsty, muddy, half-famished and wholly exhilarated.

Blood sports were devised to divert the jaded monarchs of medieval Europe. William the Conqueror set aside great chunks of England in which to hunt everything that moved. His son, William Rufus, was slain by an arrow in the New Forest while hunting. One wonders if it really was a political "accident,"

Frightened stag breaks away from his "box" and lights out. He will be recaged later.

as history claims, or if Walter Tirel, the bowman, simply couldn't take any more royal hunting. In France, Louis XIV scoured his royal forests for stags; his fat, dull and dreary descendant, Louis XVI, put in ten-hour days on horseback chasing what game was left—to the detriment of his rule (he ended up on the guillotine) and the marital bliss he might have mustered up with his queen, the lovely young Marie Antoinette. Thanks to his infatuation with the chase, he seldom saw her for the first years of their marriage, though she did share the guillotine with him in the end.

The English landlords carried their sport to Ireland, and the peasantry grinned and bobbed and pulled their forelocks as the gentry trampled their crops and broke down their fences. If they didn't react politely, the serfs were briskly taken care of.

Now a sort of gilt-edged democracy has taken over. Doctors, nightclub owners, farmers' daughters, garage managers, even Americans—all take part as long as they can come up with a good hunter ($1,000 to $2,500), the cost of keeping it (upward of $750 a year), a "box" to transport it to a hunt (same price as a boat trailer), proper apparel (up to $1,000), subscription to a hunt club ($125 to $250) and "cap" fees, so called because they used to be collected in a hunting cap ($5 to $25 a day). No sport for pikers, this.

The collected funds are hardly ever enough to run a hunt club. The master of the hunt must keep, feed and breed the club pack of hounds, maintain up to ten horses of his own, along with several sets of red livery, and pay the wages and clothing costs of the

Wrestling the stag into his harness takes three strong Irishmen. That's all for this week.

hunt staff. The master of the Galway Blazers is given $7,500 to run the hunt, but must raise that much again to pay the heavy expenses.

As for the quarry of all this expensive chasing around, it usually turns out to be a red fox. Huntsmen may speak of it as "deucedly clever" and describe how it tightropes along fence tops and splashes through brooks to throw the hounds off scent. Foxes eat field mice and rabbits and vary their diet with insects and an occasional berry. Henhouses are now infrequent dining-out spots. Far too expensive in the long run.

There are many harrier clubs which dispatch their aficionados after big, husky Irish hares, which cover a few square miles, running in circles. Foxes carry on for five or six miles before they are spent. Red deer, the original prey of European sportsmen, can hang on for up to 20 miles—enough to settle the liver of the most demanding horseman. Such runs were heavily taxing to the horses, exhausting to the hounds and, one might say, killing to the stag. Today, Irish stag hunting is limited to two clubs and regulated so that the deer is brought to the area in a wheeled cage, then released to run. The hounds are held for ten minutes and then "cast" by the master. Then off goes the whole shebang.

A touch of Irish mist

When finally the stag is brought to bay by the hounds, six or seven men wrestle him into a rope noose and get him home to rest up for next week's fun. Foxes, too, get away with their lives (if not their equanimity) about eight times out of ten for, although they are wild, they can make the hounds lose the scent; that is known (no kidding) as "throwing up." When that happens, everyone gets a chance to catch up with the leaders, steam rises from the blowing horses, the hounds snuffle around through the gorse, obviously ashamed at having thrown up, and the huntsmen produce their silver riding flasks for a touch of a liquified form of Irish mist.

If the fox has gone to ground and the hounds know it, the master may use terriers and spades to dig it out and then let the dogs kill it. But there seem to be many foxes in Ireland, so they seldom bother. The master simply gets them going on a new scent. Cubbing season, in September and October, is the time of death for foxes, since it is highly important to the pack that the young hounds which are first running with it should have the instinct to kill a fox satisfied and impressed upon them.

A strange business, this—and it looks as though it will continue as long as there are open stretches of country, warm pubs, something to chase—even if it's only a drag—and, above all, money.

The Master of the hunt, wearing the traditional hunter's "pink" coat, greets gathering riders.

Exhilarated, members of an Irish hunt club take a break and a nip at day's end.

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SINGAPORE

By Claudia B. Kidwell

You can't judge us by what we wear

A Smithsonian exhibit shows democratization of American dress since the days when a gentleman or lady stood out in silks and satins

Simple white linen petticoat (left) with blue woolen stripes contrasts with the silken creation of a lady of fashion in the late 1700s.

Historian Carl Bridenbaugh has written that "Anyone walking down High Street, Philadelphia; King Street, Boston; or Broad Street, Charles Town; in the 18th century could easily have distinguished townsmen from countryfolk by the striking differences in their clothing." A gentleman's three-piece velvet suit or embroidered waistcoat contrasted markedly with the cotton jacket and breeches worn by clerks and shopkeepers. A lady's silk gown was a far cry from the homemade gown and petticoat worn by the less wealthy.

Yet today, two centuries later, it is impossible to tell, by a glance at street clothes alone, who is the banker and who the garbage collector, who the lawyer and who the law clerk, or for that matter (given only a rear view), who is the mother, who the daughter, who the boy, who the girl.

Thanks to the Industrial Revolution, dress, like so many other American objects, has become democratized. To demonstrate the changes that have taken place over the centuries, an exhibition of American clothing will open to the public on September 21 in the Smithsonian's Museum of History and Technology.

The display, "Suiting Everyone," is divided into four sections. The first, "Clothing for Somebody," contrasts the tailor-made suits and dresses, all in imported fabrics, that garbed the wealthy in the 18th century, with the simple, homemade clothing of the vast majority of Americans. The second and third sections, "Clothing for Anybody" (1800 to 1860) and "Clothing for Everybody" (1860 to 1920), highlight the innovations leading to the development of the "ready-made" clothing industry inspired by such novelties as the spinning machine built through the memory of Samuel Slater, and Eli Whitney's cotton gin. The final section, "Something for Everybody," suggests the variety of clothing available to today's Americans.

A collection of garments which were all ready-made before 1860 indicates the wide choice offered to American males in the first flush of clothing manufacture. Among them are a dress coat, frock coat, satin vest, dress shirt, pantaloons and a selection of military clothing. But a woman's silk dress, dating from about 1858, points up the fact that most clothing for women was still custom-made by dressmakers at this time.

Examples of machinery for sewing, cutting and pressing are shown—including Howe, Singer and Wilson patent models—a long knife cutter, a straight knife cutter and a round knife cutter. There is also a manually operated tailor's "goose" (an early pressing tool) and a steam pressing machine specifically designed to press collars.

Eighteen coats in varying sizes indicate how the clothing industry attempted to fit everybody. A num-

Eighteenth-century gentleman's waistcoat (right) is of finely embroidered white silk. Most made do with plain fabrics like unbleached cotton.

A simple, cotton suit served as "Sunday best" for the ordinary man in Colonial days, a gentleman who employed him wore handsomely tailored velvet (right).

ber of pictures illustrate the mass immigration which provided the labor force for this industry.

Between 1860 and 1920, Americans were offered an ever-widening choice of ready-made clothing, and examples are on display. Here may be seen men's items such as a bathing suit, a smoking jacket, a nightshirt, uniforms, Levi's pants, overalls and a chalk-striped double-breasted suit of about 1915 vintage. Levi's early jeans, incidentally, were brown, not blue. Women's clothing features shirtwaists, bathing dress, wash and lingerie dresses, golf cape and a seal plush coat.

"There was a time," it was recounted in 1872, "when a ready-made garment of any kind could be readily recognized about as far as the wearer could be seen. Hence there was a sort of shame in the purchase and wear of such clothing and it was considered almost disreputable to bear it; it was at once a reflection upon a man's taste and a supposed indication of his poverty." Clothing of this nature, often defined as "slops," although a part of the history of the ready-made, had little to do with the growing democracy of dress. The rising classes of 19th-century America thought of themselves as being as good as anyone else and sought clothing to prove it. The custom tailors recognized this aspiration and modified their methods to fill the demand for respectable clothes that could be bought off the shelf for a reasonable price.

Thus were born "store clothes." In America they assumed an acceptable character. In Europe, well into the 20th century, cheap store-bought clothing looked undeniably cheap.

Other developments boosted the progress of the American clothing industry. New fabrics came into being, machines were improved, retailing methods were streamlined and by the end of the 19th century middle-quality clothes were being mass-produced for the majority of Americans. To show how clothes were retailed, the exhibit contains a section, "Getting Clothes to the Consumer." It deals with specialty and department stores, as well as products available by mail order.

It is hard to pinpoint the exact time when clothes can be said to have been democratized, but it had happened by 1920, as is made clear in *Suiting Everyone*, a book being published in conjunction with the exhibit. Americans became the world's best dressed

people, and European observers commented that their clothes obliterated their ethnic origins and their social distinctions. The new fabrics, synthetic and designed for easy care, have been extra flourishes on a situation that had already arrived.

"If it be true . . . that the condition of a people is indicated by its clothing, America's place in the scale of civilized lands is a high one. We have provided not alone abundant clothing at a moderate cost for all classes of citizens, but we have given them at the same time that style and character in dress that is essential to the self-respect of a free, democratic people."

So wrote a second-generation clothing manufacturer, William C. Browning, near the turn of this century. How amazed he would have been at styles today, when every man can look like a movie star, every woman like the First Lady, with a minimum of clothing maintenance. The section of the exhibition called "Something for Everybody" has a selection of some 50 garments that bear out this final democratization.

The growth of manufacture during the 19th century meant that anyone could wear Pearl Shirts.

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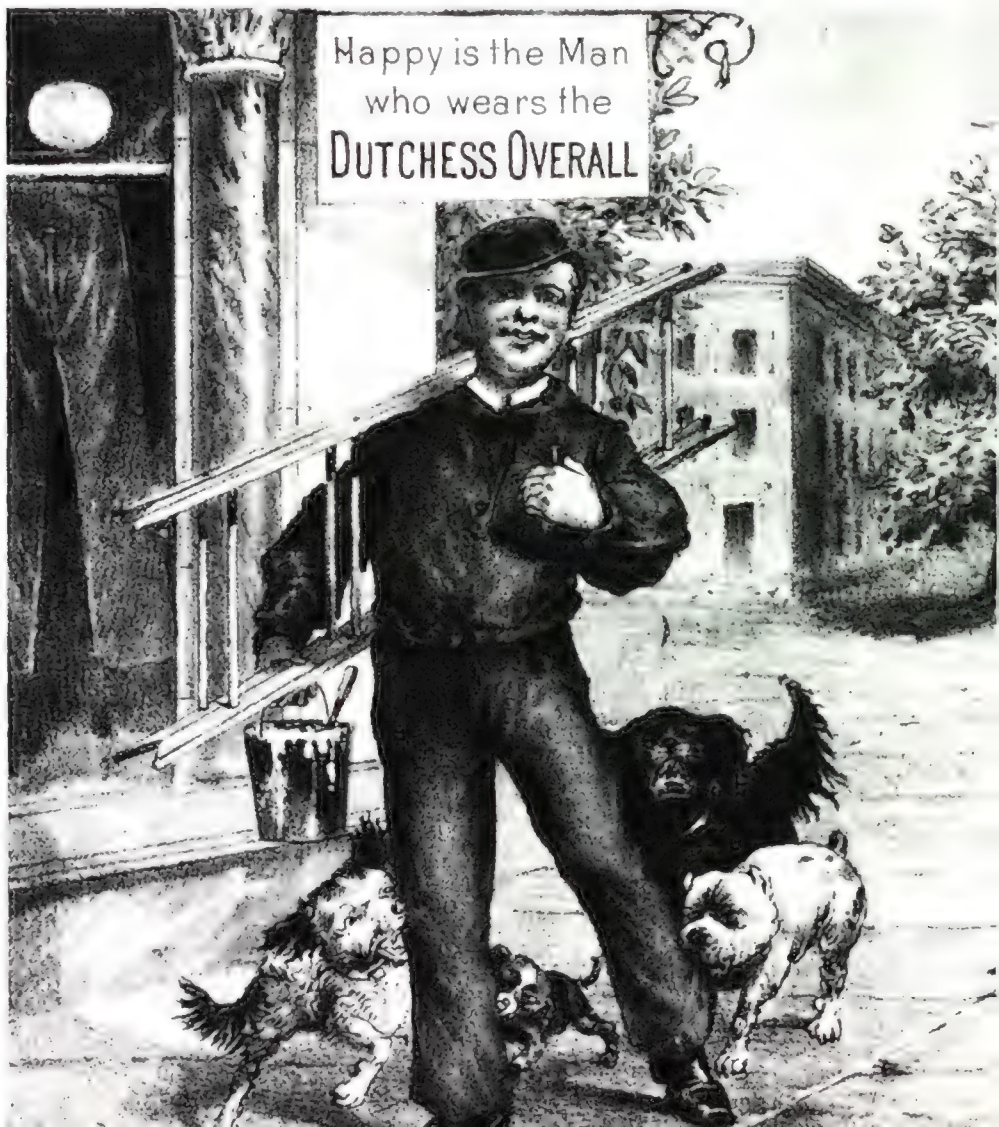
A late 19th-century catalog advertised night shirts for anyone who could come up with $5. Heavy cloth was made into overalls sturdy enough to foil over-aggressive dogs (below).



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Photographs and text by Marion Kaplan

In East Africa, poaching worsens

As long as the price keeps going up, the illegal trade goes on, but it is a minor factor in the problems for wildlife

The ongoing war between poachers and government in East Africa is escalating. World prices for ivory, skins and rhino horn have never been so high. Speculators in Japan, India and the People's Republic of China have been stocking ivory, an ancient commodity newly fashionable, forcing up the price through sheer demand.

Last year when Kenya, in desperation, banned all elephant hunting and ivory dealing, the price for ivory was $30 to $70 a kilo (2.2 pounds), depending on quality. Now the price is higher still, but Kenya is allowing limited elephant hunting: 600 animals a year out of a remaining population of about 150,000.

Tanzania is experimenting with a draconian prohibition against all types of hunting. Zaïre, too, whose ivory—along with truckloads from the Sudan and Uganda—had been smuggled through Kenya, has now imposed a total ban on all hunting from February through June of each year. Truckloads worth up to $500,000 have been intercepted at Nairobi.

Many park and game wardens, while admitting that the situation is bad, will not say how bad. The subject is touchy and they do not wish to be quoted. One game warden does say ten elephants a day are being taken in his district. Professional hunters, researchers and wardens tell of discoveries in the bush of animals that have been shot, speared, snared and poisoned.

Kenya, Tanzania and Uganda have built up honorable reputations in wildlife conservation. Numerous national parks and reserves have been created. Tour-

Poachers captured by rangers in Kenya's Tsavo National Park are made to carry their ivory

booty back to headquarters. No one knows
how many illegal kills go undetected each year.

A unit of the antipoaching patrol moves out on camels, better than vehicles in rough country.

ism, for Kenya especially, has become a major source of foreign exchange. Thus Africans are sensitive about poaching stories. They fear the implication would be that no one cares (many do) and that there are not many animals left (and there are).

Poaching arouses mixed emotions. The profiteer has a simple urge to benefit from high prices. In the conservation world, feelings run to frustration and suspicion. The fury and frustration come from a sense of helplessness: For every poacher caught red-handed, many more get away.

Even among colleagues in the game department, some suspicion exists. Wardens may suspect their own staff, the local police, district officials—anyone.

"One is suspicious all the time," says Ian Hughes, former warden of an antipoaching unit that uses camels as well as vehicles on patrol. "It's a nasty feeling." Hughes, one of the last of the English game wardens, helped train his African replacement.

The camel unit was formed almost three years ago to cope with armed gangs of Somalis from the north who were killing leopards and rhino.

"The unit did well," recalls Hughes. "Soon it became difficult to find Somalis. Now they are back—because of the high ivory price.

"Of course, it's not only Somalis who poach. But in the northern desert area the Somalis seem most able and eager to work in the conditions there. A man might have a rifle—if he has good contacts—or a spear. He will carry a trap and a little bag containing tea and sugar. He wears a loincloth, travels light. He can live as close to the ground as an animal.

"We catch them now and again—by laying an ambush round a trap they have laid. A man's got to come back to his trap. But it's always the first time they've done it, they say, and they don't know anything. We can only guess at the system. . .

"A poacher knocks off a few animals, then stores the trophies in the bush. We have found skins buried in plastic bags with mothballs! Then he goes to the nearest town where he makes contact, probably in a miraa bar, with the boys who have transport. Miraa is a leafy twig, a stimulant, quite legal.

"Deals are made but no money publicly changes hands. One night soon after, a small truck heads for the bush, makes a quick light signal. The trophies are loaded, the truck disappears—going at first on back roads, and then, nearer Nairobi, on main roads where it is one vehicle in a line of traffic. In Nairobi—or Mombasa, perhaps—the trophies are sold to the big money men. All word of mouth. The big people rarely go near the trophies, of course, so it's almost impossible to trap them."

In Kenya the game department first reacted to high elephant losses by restricting licenses to one elephant per hunter per year and raising the cost from $290 to

Marion Kaplan is a writer and photographer who reports frequently from Nairobi.

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From the 18th and 19th centuries come the warm and beautiful designs in furnishings, tools and accessories that are working a new revolution in the quality of life of twentieth century man. Read here how the Early American Society can help you bring the beauty of early America into your family's life.

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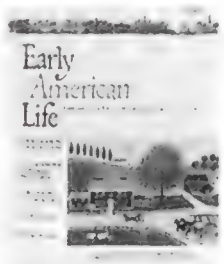

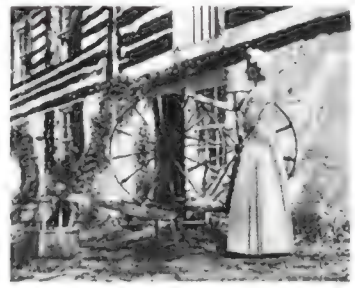

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$725. The cess, an extra tax on tusks, was multiplied fivefold so that, for example, on 70 to 90 kilos of ivory, the cess was $13 for each kilo.

The object was to diminish the number of license applications by hunters shooting for profit rather than sport and to reduce improper use of licenses. Then came last year's total ban on elephant hunting and ivory dealing, and now the strictly limited hunting.

A major disadvantage of the ban was that it stopped the flow of information on poaching gangs from normally widespread legitimate hunting parties. "I can't see the ban helping the elephant much or hurting the bigger racketeers," a warden said.

Is the poaching menace exaggerated out of proportion? Ian Parker, a wildlife management consultant, feels that poaching is an emotional issue. He believes that conservationists tend to ignore other reasons for the decline of wildlife populations.

Ivory production—or elephant deaths—has increased steadily in East Africa since 1925, he points out, and follows a curve closely corresponding to human increase, "the true cause for decline of wildlife."

The major source of ivory throughout this period has been game department "control" shooting—killing in defense of human property. As people occupy more land, this practice will continue, and to try to resolve poaching apart from controlling population increase, thinks Parker, is downright stupid.

The debate goes on, and so does the war against poaching. In the bleak desert landscape of northern Kenya, the camel patrols maintain their watch. They look comic. It is hard to resist jokes about game scout "camelflage." Yet the unit has a deadly purpose. The patrols may find themselves outnumbered by gangs of up to a hundred poachers; the usual number in a patrol is about ten men, with almost that many rifles.

Gangs, no matter their size, now maintain a sentry day and night. Gunfights start when the scouts, led perhaps by fresh footprints, sight a sentry or a sentry sees the antipoaching patrol.

Compared with the city racketeers, the poachers take many risks and make little money. Arrayed against them are African rangers in the parks, and game scouts who patrol the areas outside the parks in trucks or on surly camels. These men earn even less, live hazardously and may die from the poison of a poacher's arrow.

In the bush, in deserts and forests, and in the cities —the campaign against poachers is being pursued vigorously. The end is not in sight.

A Tanzania ranger demonstrates the simplicity and cruelty of a wire snare, killer of animals.

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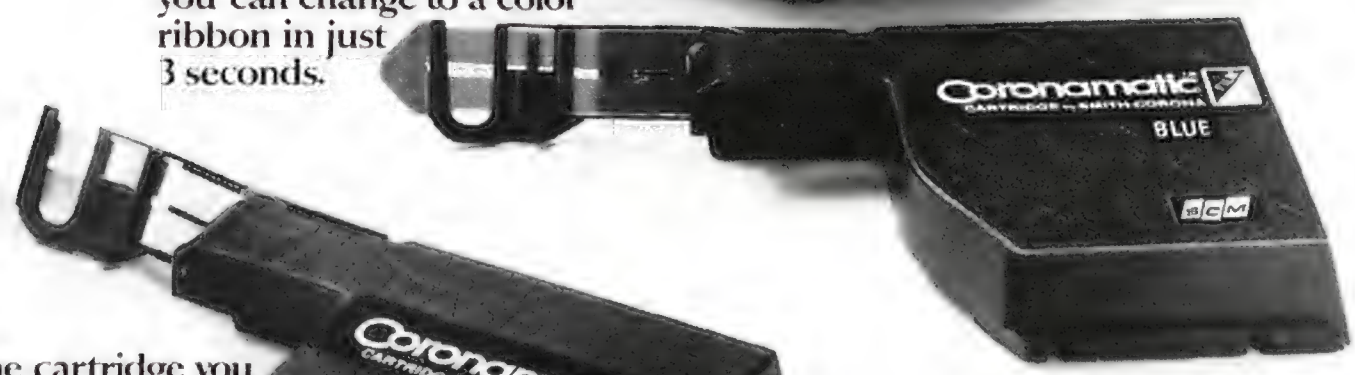

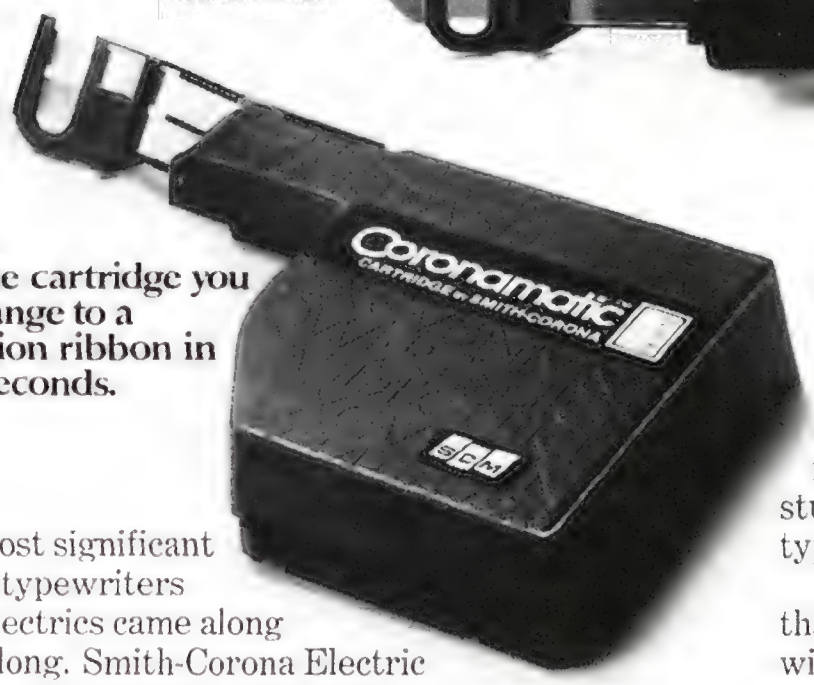

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By Timothy Green

The ultimate private library

Long a haven for England's great authors, this venerable institution in London serves a literate and growing constituency

For T. S. Eliot the trials of starting out on a literary career in the 1920s were not just that he had to work in a bank to make ends meet. He found also that, by the time he had completed his financial chores, the library of the British Museum, from which books may not be removed, was always on the brink of closing. "I had only my Saturday afternoons free," he once recalled, "but when I had installed myself there . . . it often happened that I had hardly opened the essential volume for which I had been waiting, when there sounded the familiar warning which corresponds to the phrase 'Hurry up, please, it's time.' "

Salvation from such frustrations, if not from those of the bank, came only when a benefactor offered Eliot membership in a unique private institution—the London Library. "It was the London Library that made my literary journalism possible," he said 30 years later, when he was installed as the library's president. "I could go there at my leisure, after lunch on Saturday, rummage the stacks, and emerge with nine or ten volumes to take home with me. Without the London Library, many of my early essays could never have been written."

His words would certainly be echoed by almost every major English writer of the last 130 years, for the London Library rivals the British Museum as an author's workshop; it is a veritable birthplace of English books. Through the years Charles Dickens, William Makepeace Thackeray, Charles Darwin, Henry James, Rudyard Kipling, Somerset Maugham and George Bernard Shaw have all been members. The current president, Lord Clark of *Civilisation* fame, (See SMITHSONIAN, November 1970), likes to recall that many years ago a member remarked, "There are only two perfect institutions in this world—the Great Western Railway and the London Library."

The Great Western Railway has long since been nationalized, alas, but the London Library flourishes and may be, as is claimed, the world's largest private lending library. The 20 miles of stacks that house nearly a million books are open to all members, who can range through them at will. Members living in London may have out ten books at a time; "country" members, being those living more than 20 miles from the library, may have 15. A book can be kept initially for one month, but the loan may be renewed indefi-

Though international in membership, library's entrance bears unmistakable insignia of England.

The London Library's Reading Room: elegant peace amid friendly shades of Thackeray and Churchill.

Photographs by Farrell Grehan

nitely, provided no other member wants it, just by dropping a renewal card to the librarian.

For such service the Library's 5,900 members pay only a modest subscription of just over $50 a year ($100 for institutions, such as newspapers or companies). Until 1968 new members had to be proposed, as for a club, by two existing members, but when the library then changed its status to an educational charity, membership became open to anyone ready to pay the subscription. Travelers from overseas can also become guest members for four months for a fee of $25, a privilege of which two or three dozen visiting American academics avail themselves each summer vacation. Historian Henry Steele Commager, for instance, always signs up whenever he crosses the Atlantic; critic Lionel Trilling uses the library when he is in London.

The London Library is, in fact, still guided by much the same motives that led to its creation in 1841 by Thomas Carlyle. Carlyle was at work in the late 1830s on a book on Oliver Cromwell, and found himself bedeviled, like so many writers before and since, by the Reading Room of the British Museum. Arriving irate at a tea party in Mayfair one day, fresh from a brush with the Reading Room authorities, Carlyle cried out for the need to create a rival library—"a lending library for home reading." What he had in mind, he said, was "a collection of standard books in various languages, calculated for the use of literary men and of all who prosecute self-instruction and rational entertainment by reading." So Carlyle and his friends set out to establish their own library.

William Gladstone chose the books on ecclesiastical history, the historians Grote and Hallam advised on classical and medieval history and literature, John Stuart Mill chipped in on philosophy and political economy (and later gave the library a fine collection of philosophical works). Carlyle himself approved a librarian, John George Cochrane, whom he envisaged as a "manager and fellow-adventurer." So the London Library opened its doors in May 1841 in two rented rooms in Pall Mall (it moved to its present home in St. James's Square in 1845), with a collection comprising 3,000 books.

Members can explore 20 miles of stacks; women find grated floors awkward.

Korea with a "C"

The new library quickly attracted many of the best writers. William Makepeace Thackeray used it while writing *The Virginians* to double-check such details as the color of General Wolfe's breeches (Thackeray also pitched in to audit the library's accounts for a couple of years). When Charles Dickens mentioned to Carlyle that he was reading up on the French Revolution as background for a new book (*A Tale of Two Cities*), Carlyle ransacked the shelves and sent two cartloads of books around to the author's home. William Gladstone continued to use the library for more than half a century; even when he was Prime Minister he was to be seen regularly in the Reading Room scanning the latest magazines, while a Scotland Yard detective kept careful watch on the stairs outside.

Books are catalogued by subject; one still finds Thailand under Siam.

Although 19th-century politicians, critics and writers found the library invaluable, its true international stature was created by a remarkable librarian named Charles Hagberg Wright, who took over in 1893 and remained in command until his death 47 years later in 1940.

He would have nothing to do with Dewey Decimal or other numbered cataloguing systems. He simply listed books broadly under art, biography, history, literature, philology, philosophy, religion, topography, plus a catchall science and miscellaneous, with sub-sections in each category for major aspects. Thereafter, the books were listed alphabetically by author, except in biography where, naturally, they were by subject. One has to be alert only to some slight eccentricities: Korea is still spelled with a "C" as it was in the 19th century; Thailand still turns up under Siam; and books on Israel go in the history and topography sections labeled Palestine and Syria.

The stacks themselves are another legacy of Hagberg Wright's librarianship. He had the interior of the library rebuilt to accommodate more than half a million books. The only quibble is that he chose

A frequent contributor to SMITHSONIAN, *Mr. Green is a London Library member.*

iron grating floors between the stacks, so that standing on the third floor it is possible to look right through all floors to the basement, a slightly unnerving experience, and distinctly awkward for women in spike heels. Nevertheless, when a proposal was made a few years ago for more suitable flooring, T. S. Eliot snapped, "This is the London Library, *not* a lady's powder room."

Locked away in a basement room, along with rare first editions, is a small collection of erotica, an arrangement which has led to some curious anomalies: Henry Miller's *Tropic of Capricorn* and *Tropic of Cancer* share a shelf with a first edition of A.A. Milne's children's classic *Now We Are Six.*

Today the library's character is changing. "Once upon a time it was a high-class club for the wealthy," says the current librarian, Stanley Gillam, "but now a great many of our members need it for professional purposes." It is a mecca for journalists, film-makers and television researchers. And whereas only 15 of the original 500 members in 1841 were women, the membership is today almost equally divided between the sexes.

Despite its literary well-being, the li-

A narrow Victorian townhouse, library is handily located in London's clubland.

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brary's financial health has given grave cause for concern for many years. An unexpected tax demand in the late 1950s first threatened an untimely demise. Sir Winston Churchill, vice-president of the library, quickly penned a letter to *The Times* declaring that "the closing of this most worthy foundation would be a tragedy." The tax money was duly raised, largely through a special sale at Christie's, the fine art auctioneers, to which several members contributed manuscripts. T.S. Eliot wrote out a fair copy of *The Waste Land,* which fetched $8,000, while E.M. Forster's autographed manuscript of *A Passage to India* sold for almost $16,000.

But the library continued to run a deficit on its regular operations throughout the 1960s, and was almost bursting at the seams with books. Its long-term survival clearly called for a substantial fund to be raised, to enable major reconstruction to take place. So in 1972 an appeal for half a million pounds ($1,250,000) was launched, a crucial test of the library's true stature. It fell on sympathetic ears. "The Library's continued existence is vital to what is now called the quality of life in an intelligent society," the *Sunday Times* said. Most people agreed, and the target was attained with ease.

The appeal has had some awkward spin-offs. So many people, attracted by the publicity, decided to join (as opposed to simply contributing) that the library now has record membership, and more are signing up daily. The only debate now is how many members can be accepted while maintaining the traditional quality of service.

As for the existing members, they would no doubt agree with T. S. Eliot when he remarked, "Very few people, nowadays, do possess a collection of books which deserves to be called 'a library.' . . . And under these conditions the London Library takes its place; this is the private library of each of its members." Novelist E.M. Forster summed it up: "It is not typically English. It is typically civilized. It pays a homage to seriousness and to good sense which is rare in these islands and anywhere. It has cherished the things of the mind, it has insisted on including all points of view and yet it has been selective. . . . It caters neither for the goose nor for the rat, but for creatures who are trying to be human."

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Book reviews

The Life Game
Nigel Calder
(Viking, $12.50)

A century after Darwin and Mendel, evolution is still a lively and controversial field. On the fringes, a Bible-based creationist counterattack is under way, and neo-Lamarckism has come into vogue. In the area of serious science, the creators of the New Evolution—the modern synthesis of evolutionary and genetic knowledge—are defending themselves against a newer concept that gives pure chance nearly as important a role as natural selection in evolution.

This is as it should be. Since evolution as a subject covers everything in biology, from molecular genetics on the smallest scale to ecology on the largest scale, it is bound to be racked by arguments as knowledge changes and grows. And since evolution is evolving steadily, anyone who is interested in the subject—which means anyone who is interested in biology—needs a refresher course from time to time.

The Life Game is such a refresher course, and one that could hardly be improved upon. Nigel Calder has what sounds like the world's most desirable science-writing job. He first takes his choice of meaningful subjects and then is given almost unlimited time and money to produce a television documentary and a book on the subject of his choice. In this book as in the others, the clarity of Calder's prose and his skillful selection and handling of ideas show clearly why he has such a job.

Only one word of caution is needed. This is not really a book for beginners, even though the large page size and the generous use of illustrations might indicate that the book is aimed at the coffee-table trade. *The Life Game* is not an introductory text but a journalistic report on what is new in evolutionary theory and research over, say, the past ten years. So those who come equipped with a good understanding of the basics of molecular genetics and evolution will get more out of this book than those who are starting from scratch.

The other quibbles are minor. Trying to cover so much, Calder gets a bit thin at times. But one of the virtues of the book is that it does cover so much—the role of plate tectonics in evolution, the latest knowledge on the origin and early history of life on earth, the newest work on fossil manlike apes, the most current research on the workings and mutations of genes. About half the book is illustrations, but every one of them is there for a purpose and has been placed with thought, to make it easy to go from picture to text and back again. Calder gives the creationists and the neo-Lamarckians almost no mention, but they really do not seem to deserve much attention in a serious work.

In short, an excellent book for anyone interested in the evolution of evolution.

—Edward Edelson
Science editor, *New York Daily News*

Chautauqua
Theodore Morrison
(University of Chicago Press, $10.50)

George Washington spelled it Jadaqua. But that was before two Methodists with a pious pedagogic bent, a flair for promotion and cash (from the invention of the Buckeye Mower) put it on the map by founding a summer assembly there, at New York's Lake Chautauqua, 100 years ago. Then it was a short course for Sunday School teachers, in tents. But the founders quickly expanded and secularized the affair to serve what they assessed to be a "hunger of mind abroad in the land," a hunger of post-Civil War rural and small-town America for self-improvement, inspiration and choral singing.

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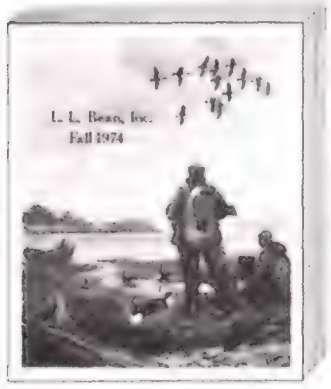

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were meeting to pursue a home reading curriculum, among them a Chickasaw Circle and a Look Forward Circle in the Nebraska penitentiary—the four-year graduates receiving their degrees on the New York campus in ceremonies featuring banners, processionals and garlanded children strewing flowers. Some 150 "permanent" Chautauquas sprang up independently, and by the 1920s circuit Chautauquas carried their own brown tents and week-long packages of performances to more than 30 million Americans in rural communities.

In its prime, the Chautauqua platform kept American public opinion informed, exposing audiences to "Fighting Bob" La Follette's attacks on special privilege, to the case for disarmament, a federal income tax, votes for women, lowered tariffs and free school lunches. It exposed them to chalk talks and scientific demonstrations, to musical performances by quintet, symphony orchestra and Mme. Schumann-Heinck. It offered seven Presidents for scrutiny (Grant to FDR, who went there to say "I hate war") and 3,000 performances by William Jennings Bryan, who swilled two pitchers of ice-water per performance and was happy even as Wilson's Secretary of State to be preceded on the platform by seven yodelers.

Theodore Morrison's *Chautauqua* concentrates on the mother institution in New York, which survives today virtually unchanged, while the others disappeared 40 years ago, done in by the Model T, movies and the radio. For his work the emeritus Harvard professor rates something short of the Chautauqua Salute, which was a general fluttering of handkerchiefs accorded by an audience for an uncommonly good performance. The style of the book is more pedestrian than Chautauqua itself; it has a less-than-lively format to match. But there are nice touches and pleasant photographs—of paddlewheelers at the wharf, of tents and gingerbread cottages, classical pavilions, the many-gabled Athenaeum Hotel with its wicker furniture and generous lawns, of sketch classes and costumed performers, of the women (summer 1917) smartly drilling in dress khaki. These evoke the atmosphere of that "serious and studious picnic" where "no giggling" was permitted "after ten, no chopping of wood before six," no killing of bats which ate the mosquitos, and no drinking of course (though the occasional package mailed to

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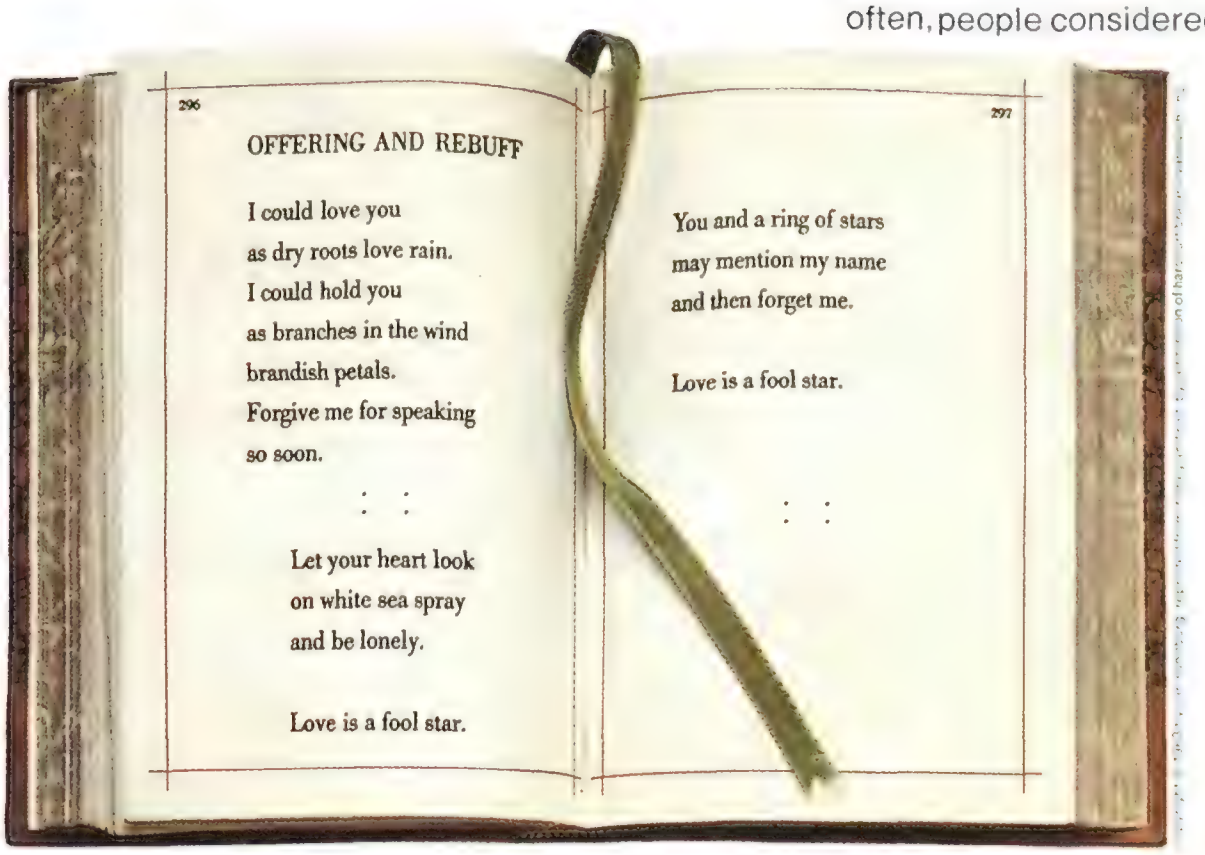
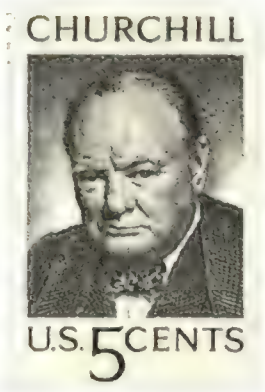
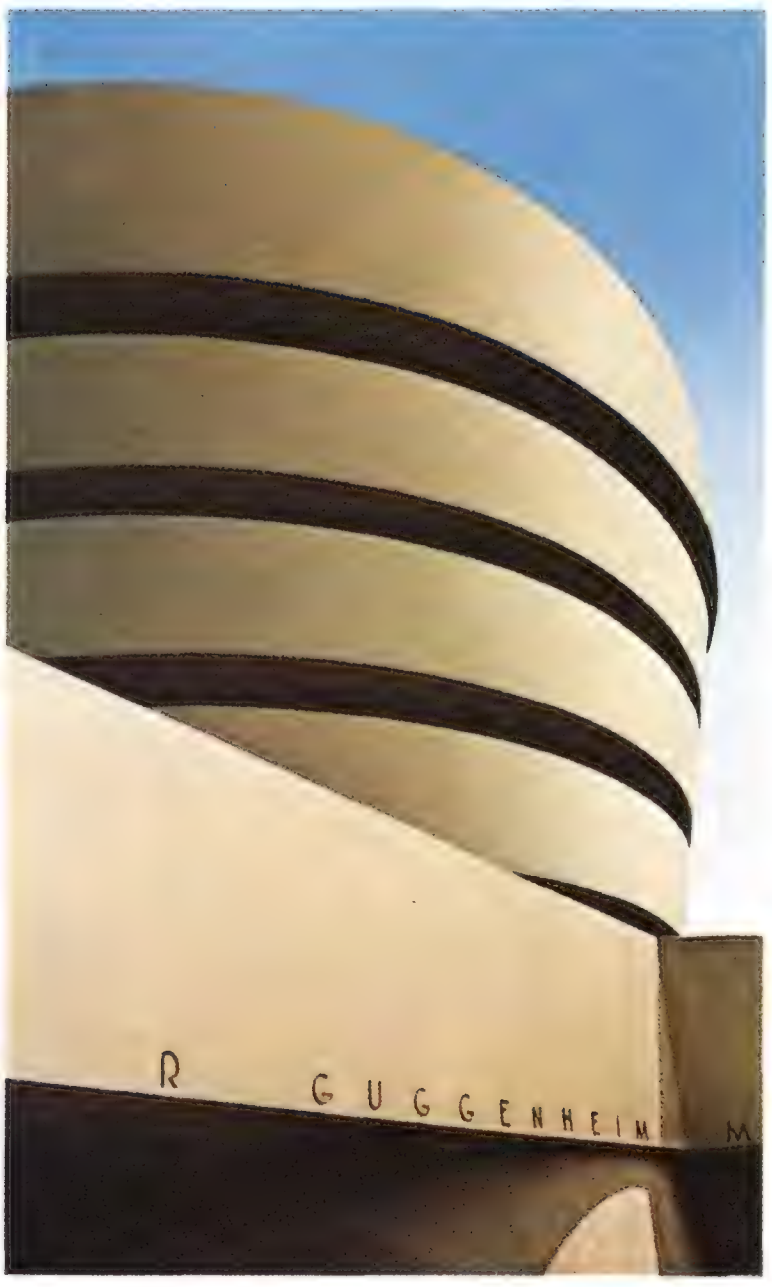


Carl Sandburg, age 85, "Offering and Rebuff."



Winston Churchill, age 77,
re-elected British Prime Minister.



Frank Lloyd Wright, age 76, "Guggenheim Museum."

Grandma Moses, age 101, "The Rainbow."

Dr. Albert Schweitzer, age 68, "Nobel Peace Prize."

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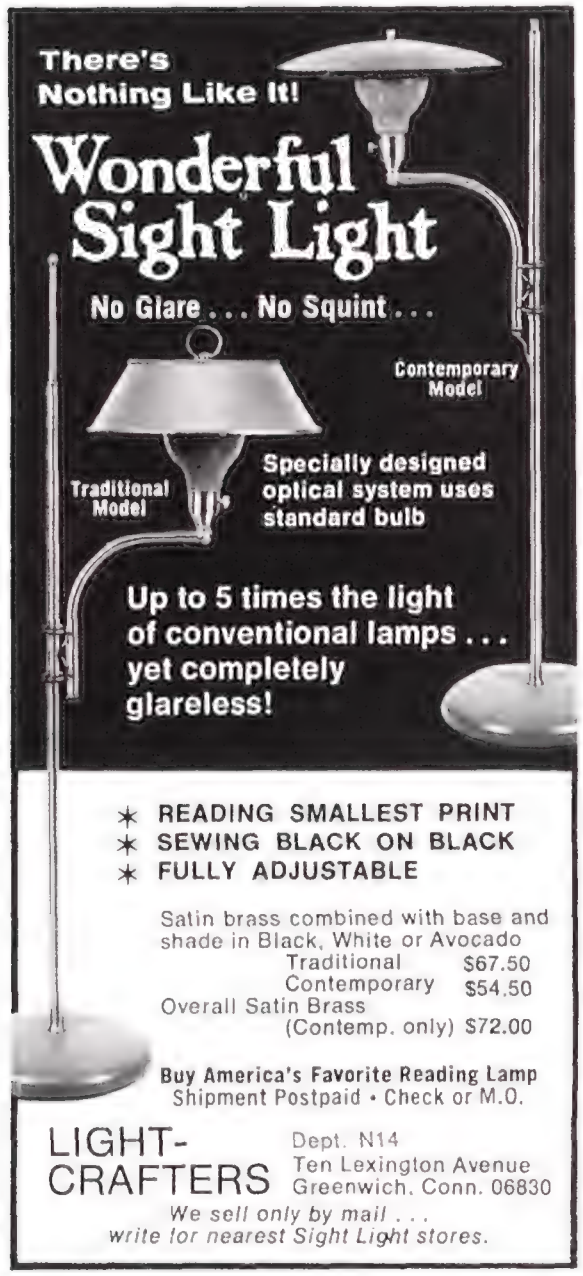
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Teddy Roosevelt called it "the most American place in America," but Kipling, put off by its earnestness, said "I don't like Chautauqua." He complained of stubbing his foot on the boulder representing Jericho in Palestine Park. William James, who went for a day and stayed for a week, said he learned a lot, including how to bake graham bread and walk with Delsartian grace, but he came away for "anything to break the unlovely level of 10,000 good people. . . ."

—Peggy Thomson
Washington free-lance writer

Lorenzo the Magnificent
Hugh Ross Williamson
(Putnam, $15.95)

Was Lorenzo de' Medici one of the great rogues of history, an assiduous operator in his private interest at the expense of the state, an exploiter and debaucher of Florence, or was he one of the rare saints of political life, wishing only to serve Florence and to enrich the lives of his fellow citizens, personally unambitious and sacrificing private advantage in the pursuit of wise policies of peace?

Hugh Ross Williamson in his full-scale study of Lorenzo inclines to the latter view, yet manages to keep his feet on the ground whenever he sees his hero, not perhaps as Savonarola saw him, but as human and fallible.

Lorenzo, like the Renaissance he represents, was a mixed bag. And how could it be otherwise? In an age of idiosyncrasy, a powerful and imaginative man tries everything by way of self-definition.

Lorenzo was from early youth a Platonist; the virtuous life, self-perfection, meant a great deal to him. He was in every sense a cultivated man, which is to say a wholly self-conscious one; but Platonism recognized orders of excellence, and it is quite natural, given Lorenzo's background, his wealth and the profound influence he saw himself exerting upon Florentine affairs, not to say those of Italy at large, that he should feel himself superior while claiming he was ordinary, as political prudence and practice required.

Was this hypocrisy? Possibly not. Lorenzo was the virtuous man in the realm of Platonic ideality. The mundane world

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had less lofty expectations of him, and it is to his credit that he tried to exceed these standards. He did in one instance deliver himself on Florence's behalf entirely into the hands of an enemy, Ferrante, King of Naples; but he and his city came out of the encounter unscathed—indeed, in improved political health. Against this and other acts of public generosity, one might lay the amassing and spending of treasure—surely at somebody's loss—the leveling of rebellious Volterra, the tampering with the Florentine dowry fund and many sins of omission.

Mr. Williamson makes a strong case for Lorenzo's statecraft, and it is quite true that his system of alliances among Florence, Milan and Naples helped to stabilize the peninsula, check the Papacy and protect Italy from invasion. But we are talking now about some 20-odd years of history. When Lorenzo died in his early forties in 1492, the Florentine state as he knew it fell apart. His heir Pietro was unequal to the task of governing wisely; he was ousted, and what the Medici had built in three generations was destroyed in a day. Savonarola's hysterical puritanism made mice of the Florentines in no time at all, and Charles VIII of France, having inherited the first standing army in Europe, gobbled the city up as easily as a sweetmeat.

The story is colorful, to say the least. We can surmise Lorenzo's part even where we don't have it from the record, but we can never know to the same degree what the period was like for the truly ordinary man, whose options didn't include error and whose heirs were as unprotected and as powerless as he was.

This biography is as engrossing as its complex subject and as rich as the panoply of Renaissance Florence. It is a fine piece of bookmaking, too, illustrated with color plates bearing upon the art and the personalities of the time.

—*Gene Baro*
Washington free-lance writer

John Marshall: A Life in Law
Leonard Baker
(Macmillan, $17.95)

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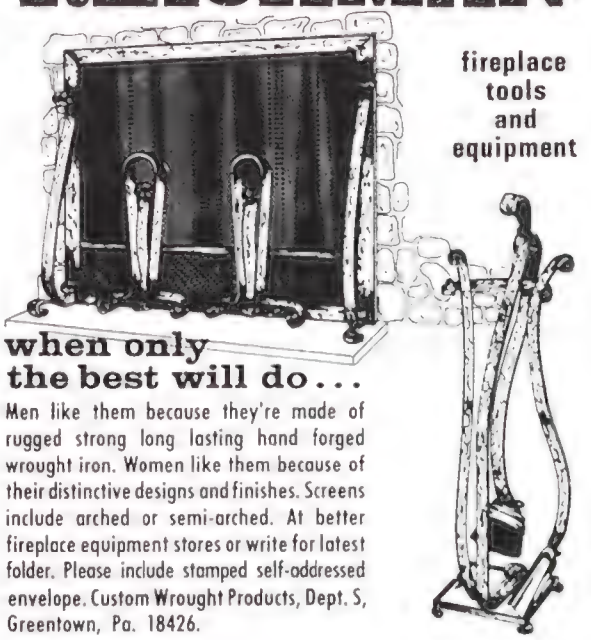

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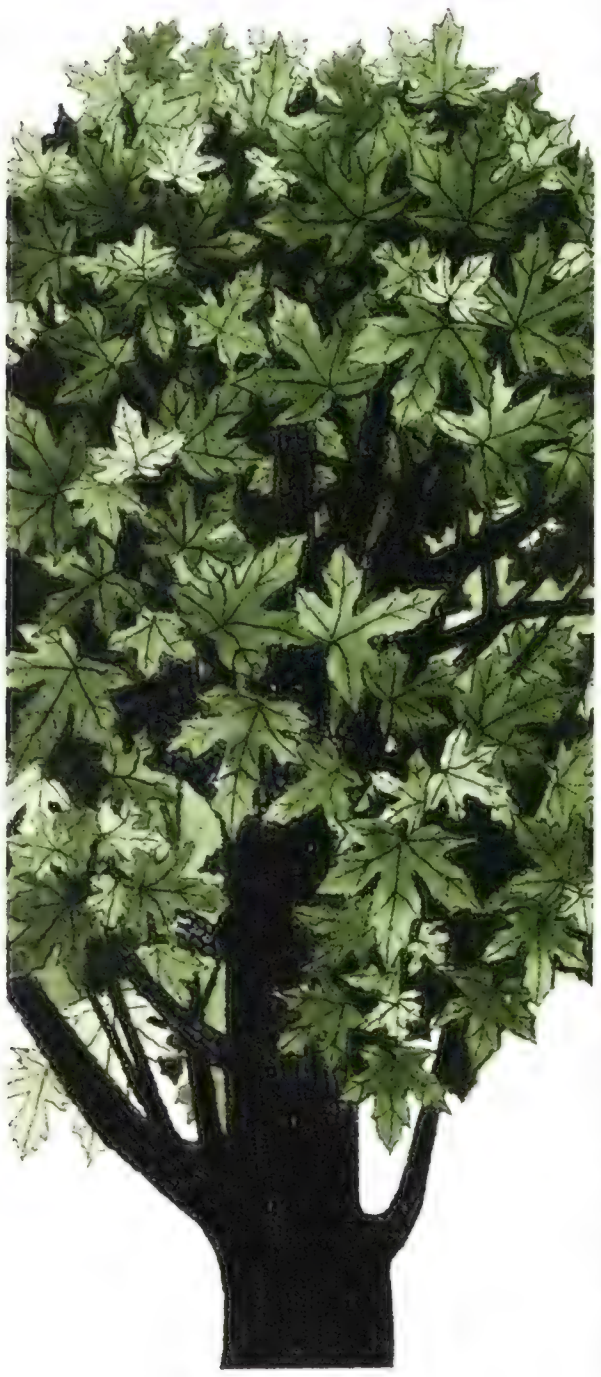

Some judges, as Justice Oliver Wendell Holmes once charged, sought to read "their own economic predilections" into the letter of constitutional law, seeing the document either as a charter of laissez-faire, or—in the Supreme Court of the 1960s—as a command to social activism.

Even John Marshall, who is frequently called "the great Chief Justice," recognized this judicial fact of life. "We must never forget that it is a constitution we are expounding," he wrote in an opinion in 1819; his emphasis was upon the last three words. Two years later he declared in another opinion: "It is most true that this court will not take jurisdiction if it should not; but it is equally true that it must take jurisdiction if it should. . . . We have no more right to decline the exercise of jurisdiction which is given than to usurp that which is not given."

All of which suggests that, since written constitutions—and particularly American constitutions, federal and state—are interpreted by judges, the judges ought to be the embodiment of Plato's philosopher-king. But Plato recognized that philosophers are not often kings, and would have agreed that they are not much more often judges. John Marshall would have disclaimed any attributes of a philosopher and if his biographers discern a legal philosophy in his work, it is that most American of philosophies, pragmatism. Marshall, whose long tenure (1801-1835) enabled him to bend the twig from which the constitutional branch grew, is one of all too small a number of American judges who have been adequately treated by their biographers.

Marshall's latest biographer, Leonard Baker, was a journalist covering the Supreme Court when he developed an interest in Marshall in 1958. His research has taken him through unpublished papers from the National Archives, the Marshall collection at the College of William and Mary and hundreds of other manuscript collections across the country. His thorough yet readable text provides both perspective and counterpoint to the four volumes on Marshall for which Albert J. Beveridge won the Pulitzer Prize half a century ago. Beveridge wrote as much about the Court and the Constitution as about the man. This is hardly to be avoided, and to a large degree Baker does the same thing. While Beveridge was concerned with Marshall as an antagonist of the Jeffersonian and Jack-

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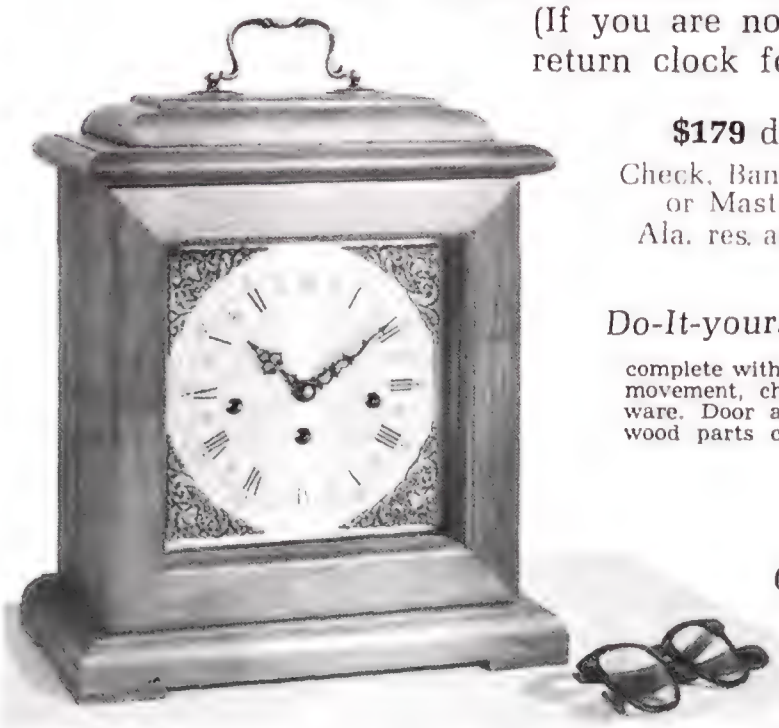

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sonian concepts of popular democracy, Baker is more concerned with features in Marshall's character which appear to shape his judicial craftsmanship. Like Jefferson, the Chief Justice perceived absolute power in government as a threat to the individual and to social institutions; but, where Jefferson's solution was frequent and general elections, Marshall's was the judiciary itself.

Marshall, as both his biographers concede, was a judicial politician as well as craftsman; he "saw himself as maintaining a political philosophy when the other branches of government were controlled by advocates of other philosophies," Baker writes. His lasting impact upon American constitutional principles derives substantially from the confluence of events in early American political history: A sharp delineation of Jeffersonian and Hamiltonian concepts of government required the Supreme Court to settle early issues of constitutional construction in terms of a choice between these concepts. It was a fortunate destiny that let the choice be made by a Court under a Chief Justice conscious of the enduring impact of the choice.

Baker's life of Marshall is the biography of a man against the background of a constitutional age; Beveridge's was a study of the constitutional age in terms of a man. Both books will give any interested reader the beginning of a grasp of the judicial era which Chief Justice Marshall dominated.

—*William E. Swindler*
John Marshall Professor of Law,
College of William and Mary,
Williamsburg, Virginia

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"You have ruined my Volaille"

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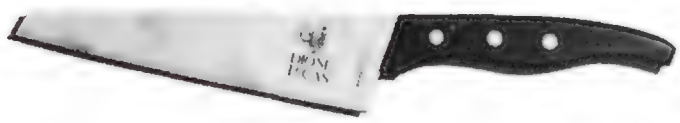

I am told by my friends who pride their cooking, that this is just that—a remarkable knife that brings a new celebration to cooking. Its balance is such, its blade so acute, that with a small flick, you can pare fat from the shank of meat.

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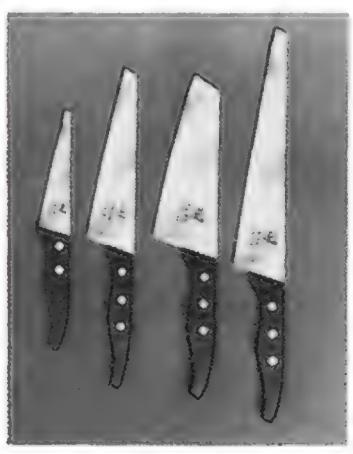

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Smithsonian highlights

Museum of Natural History
"Ice Age Mammals and The Emergence of Man" is a major new exhibit hall tracing the development of the Ice Age, including its geological aspects, flora, fauna and the evolution of Man. Featured are the phenomena of gigantism, migration, isolation and the extinction of animals. Glaciation, continental land drift and land bridges are also depicted. Visitors walk through the area on a ramp suspended above moats, islands, glaciers and caves inhabited by giant mammals and prehistoric man. A special area recreates, in full scale, a Neanderthal burial scene (opposite)—opens mid-September.

Museum of History and Technology
"Suiting Everyone" (see p. 84) is a multidisciplinary exhibit tracing the 200-year history of American clothing and its manufacture. Beginning with stark contrasts in Colonial times between the tailored clothing of the wealthy few and the simple garb worn by the majority of Americans, the exhibit follows the democratization of clothing brought about by the Industrial Revolution, the growth of the ready-to-wear industry and the desire of every American for good-quality clothing —opens September 21.

National Collection of Fine Arts
"Chaim Gross: Sculpture and Drawings" is an exhibition of 72 works spanning 50 years of the artist's life. Known for his carvings in a wide variety of woods, Gross is the recipient of numerous major awards for his sculptures. Some of his larger mural carvings appear in government buildings in the Washington area—opens September 13.

Division of Performing Arts and Musical Instruments
From October through April there will be six different concert series ranging from country to chamber music. Some series have become tradition at the Smithsonian, but at least two additional programs will be announced in next month's "Highlights," among them a new jazz series at the Hirshhorn Museum and Sculpture Garden. Beginning in October, the public is invited to these popular and critically acclaimed concerts:

- "Music from Marlboro" returns to the Baird Auditorium for a series of three Saturday afternoon concerts. The famed touring group from the Marlboro Music Festival presents unusually varied instrumental and vocal programs.
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Freer Gallery of Art
After a year of special exhibitions commemorating the 50th anniversary of the Freer, the American Artists' Galleries have been restored to their original state. Of particular interest is the collection of James Whistler paintings that are once again on view.

National Portrait Gallery
The first major Smithsonian Bicentennial exhibition, "In the Minds and the Hearts of the People: Prologue to the American Revolution," documents the turmoil and discontent of the Colonies in the years preceding the Revolution. Eighteen Georgian settings of furniture and decorative items serve as display rooms for the documents and paintings by such artists as Charles Willson Peale, Sir Joshua Reynolds and Allan Ramsay.

Anacostia Neighborhood Museum
"The Message Makers" is an examination of the decision-making process utilized in the media—radio, television, newspaper and film—in determining the selection of a message. Vital to the selection process are the influence and impact the message has on the lives of people in general and black people specifically. Included are Teletype and video-tape machines, newspaper clippings, films and slides—through October 27.

Contributing Memberships
Persons who contribute $50 or more annually to the Associates support the Institution's national educational programs and enjoy additional privileges. Graduated benefits include:
- Assistance in communicating with any part of the Smithsonian.
- Information on any museum in the world in advance of a visit there.
- Smithsonian annual report and other publications.
- Invitations (when in Washington) to exhibition previews and special events, including admission of a guest.
- Research service for questions about subjects related to the Smithsonian.
- A remembrance from the Smithsonian in the form of a commemorative object or work of art. Write: Contributing Membership, Smithsonian Associates, Smithsonian Institution, SI 118, Washington, D.C. 20560.

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STRATEGY & TACTICS magazine is published bi-monthly. Each issue contains:

★ A ready-to-play conflict-simulation game with a 22 x 28" playing surface, die-cut playing pieces, and complete rules.

★ An analytical article on the same subject as the game in that issue.

★ Other feature articles on historical and military subjects.

★ Game and book reviews, commentary on existing games, and discussions of subscribers' questions.

The magazine is 48 + pages long, and all material is handled in a highly organized (and easily understandable) graphic format.

Games recently published in STRATEGY & TACTICS were: *GRUNT* (ground combat in Vietnam), *LOST BATTLES* (tactical combat in Russia, 1941-44), *USN* (the war in the Pacific, 1941-43), *COMBAT COMMAND* (tactical combat in Western Europe, 1944).

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Travel the Smithsonian way

You are part of the Smithsonian when you travel with other Associates on a Foreign or Domestic Study Tour. Whether your interest is geology, anthropology, natural history, folklore, archaeology, art, music, drama or architecture, there is a tour for you. You will be accompanied by Smithsonian curators or other experts and, where possible, taken behind the scenes of Smithsonian exhibits and research projects.

FOREIGN STUDY TOURS

Afghanistan and Pakistan—October 20-November 16: Archaeological and historic sites (waiting list only).

Egypt and Ethiopia—January 4-26, 1975: Ancient monuments and sites in Cairo, Luxor, Aswan, Aksum, Lalibela and Addis Ababa.

Ancient Sites of the Maya—January 11-30, 1975: *Argonaut* yacht cruise from Montego Bay to British Honduras, Guatemala and Yucatán. Return by air via Mexico City.

The African Quest—February 14-March 25, 1975: Fly to Tanzania and then board the *MTS Apollo* at the East African port of Dar es Salaam; circumnavigate Africa to Dakar, calling en route at Zanzibar, Madagascar, Mozambique, Cape of Good Hope; cruise up the Congo River.

Australia and New Zealand—March 14-April 8, 1975: Flora, fauna and anthropology, via Tahiti and Fiji.

Northern Spain and Southern France—May 13-June 4, 1975: Cave paintings and the art of Paleolithic man.

Classical Greece—June 10-July 2, 1975: Famous historic sites in central Greece and the Peloponnesus.

Copenhagen to Lisbon—August 23-September 14, 1975: Cruise on the *Argonaut,* with stops at major European ports.

Russia—September 20-October 4, 1975: Soviet art and architecture.

Hawaiian Islands—November 8-21, 1975: Petroglyphs and natural history.

DOMESTIC STUDY TOURS

Williamsburg Weekend—September 19-22: A return to Colonial days as you meet members of the Williamsburg Foundation, explore the crafts and architecture, eat Colonial food and stay at the Williamsburg Inn.

All About Trains—October 9-13: A weekend in Washington, D.C., visiting the Smithsonian's Halls of Transportation; ride the Metroliner to Baltimore and tour the B&O Transportation Museum. Weekend trip includes day in Harper's Ferry.

All About Antiques—October 12-19: In the spectacular setting of Connecticut fall colors, accompany an expert to see the fine antiques in New Haven, Wethersfield, Farmington, Hartford, Litchfield and Woodbury.

Florida Everglades—November 10-15.

Christmas at the Smithsonian—December 6-8: Festivities include an old-fashioned tree-trimming party in the Great Hall of the original "Castle" building.

For information on specific foreign tours, write Miss Bliss Schumann, Foreign Tours, Room SI 123; for information on specific domestic tours, write Mrs. Rosa Mae Howe, Domestic Tours, Room SI 106, both at Smithsonian Institution, Washington, D.C. 20560.

Traveling Exhibition Service

There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write: Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- Cambridge, Massachusetts—"Kurt Kranz: Bauhaus & Today" (Massachusetts Institute of Technology, September 21-October 20).
- Cheney, Washington—"The American Artist & Water Reclamation" (Eastern Washington State College, September 7-October 6).
- Huntsville, Alabama—"Graphics by Six Swiss Sculptors" (Huntsville Museum Board, September 7-October 6).
- Columbus, Georgia—"American Coverlets" (Columbus Museum of Arts & Crafts, September 14-October 13).
- Pensacola, Florida—"Mississippi Folk Architecture" (Historic Pensacola Preservation, September 21-October 20).
- West Liberty, West Virginia—"Alexey Brodovitch and His Influence" (West Liberty State College, September 14-October 27).
- Juneau, Alaska—"Children in Bondage" (Alaska State Museum, September 14-October 27).
- Lincroft, New Jersey—"Our Only World (VI)" (Brookdale Community College, September 7-October 6).
- Flint, Michigan—"A Children's World (I)" (Flint Institute of Art, September 21-October 20).
- Jacksonville, Florida—"200 Years of Royal Copenhagen Porcelain" (Cummer Gallery of Art, September 21-October 27).

Parking on the Mall

Metro construction has made parking on the Mall near the Smithsonian complex extremely difficult. All parking prior to 10 A.M. is restricted. The use of public transportation is recommended. Write Associates' Reception Center, Smithsonian Institution, Washington, D.C. 20560 for current information.

Smithsonian Commons

Located in the original Smithsonian Castle building, the Commons offers a buffet luncheon and salad bar from 11:30 A.M. to 2 P.M. ranging from $1.50 to $2.25. Also available are coffee and pastries from 10 to 11 A.M.—open Monday through Friday.

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- In children's homes: supplementary food, clothing, medical care, and dedicated housemothers.
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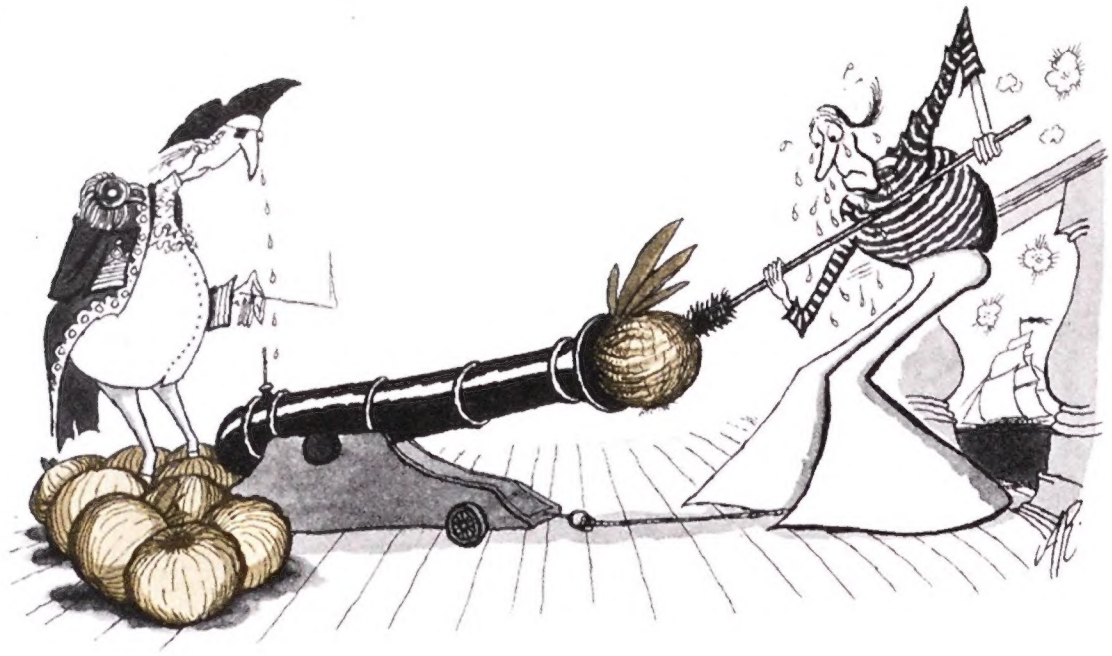
By Patrick Ryan

What's good at sea is bad out in space



Good news these days is rare and it is therefore a savory pleasure to advise that the feared famine of *Allium cepa* has not come to pass. The delectable onion is now back in good supply. Last year the outlook was bleak indeed for all lunch-counter gourmets who regard hamburgers as inedible without a raw onion garnish. Because of flooded crops and poor harvests, the pungent bulb became so hard to get that bun-and-burger emporiums could no longer offer free helpings and kept secret stocks of precious chopped onion hidden away for issue only to customers who insisted. Even the chef at the National Press Club in Washington had to drop the onion topping on his $2 hamburger, and darkly hinted that "You have to know somebody these days to get an onion."

Such lamentation over the lack of the edible lily can be heard echoing back through the arches of the years. Laborers eating onions are depicted on Egyptian tombs of around 3000 B.C., and the pharaohs fed vast quantities to their multitudes of pyramid builders when they were threatened by epidemics. Apart from any germicidal powers, such a diet may have lessened the risk of infection by ensuring that few contagious visitors would venture within nose-range of massed bands of onion-fed slaves panting in odoriferous unison as they hauled megaliths up geometric mountains.

Turks in the 18th century ate onions to prevent goiter, while French doctors were prescribing its consumption as a cure for gravel and dropsy, and Lord Nelson at the run-up to Trafalgar enforced the same diet on his sailors as a sovereign specific against scurvy.

More specialized and latter-day support for this naval belief in the prophylactic value of *Allium cepa* was provided just a few years ago by reports from a group of British doctors who credited the essential vegetable with the capacity to help ward off heart attacks. Experiments in a hospital at Newcastle upon Tyne revealed that patients fed on a diet heavily laden with onions suffered less from blood clotting (even those consuming fat-enriched meals were more resistant) than did an onionless control group.

So far as the nose can detect, however, there does not seem to have been any major campaign launched by our medicine men to combat coronary thrombosis by putting the breadwinners of the world on diets predominated by the penetrating onion. This policy may be purposeful rather than neglectful: Bottom in *A Midsummer Night's Dream* put a direct point on the difficulty by ordaining at dress rehearsal that for the actual performance the actors must "eat no onions nor garlic, for we are to utter sweet breath" and thus persuade the audience to pronounce their performance to be sweet comedy.

Perturbation was lately aroused in the Mother of Parliaments when duly elected Members of the House of Commons complained to the Speaker that both their sleep was disturbed and their hunger sharpened by the fragrance of frying onions which wafted nightly through the legislature. Secret Service chaps with highly trained nostrils traced the offending bouquet back to a mess room where the policemen charged with the internal protection of Parliament were cooking their suppers of steak and onions. In order that the government of Britain could go bumbling along, an edict was issued commanding that the coppers should henceforth refrain from frying onions.

In America, the Western Regional Research Laboratory of the U.S. Department of Agriculture made a study of the most suitable foods for astronauts and ingeniously developed a system for measuring in quantitative terms "the flatus-producing effect" of various comestibles.

Onions, these gallant scientists eventually reported, stand high in the lists of wind-provoking vegetables, and astronauts were therefore forbidden to ingest them before a flight into space. NASA's injunction tends yet again to support the contention that the onion is a foodstuff that builds you up physically but drops you down socially. So what shall it profit a man if, on a diet of anticholesterol onions, he has the healthiest heart in the world, but everybody keeps walking backward from his words, his own wife won't let him kiss her and he can't even go to the moon?

The Mercedes-Benz 450SE. Will the others ever catch up?

©Mercedes-Benz 1974

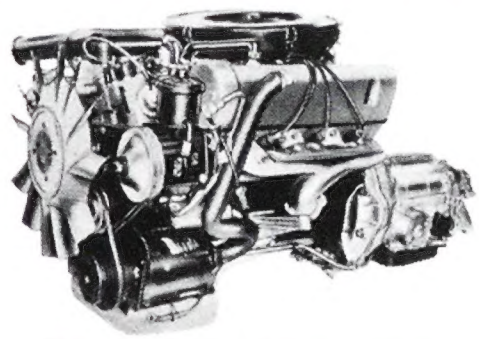
Mercedes-Benz has always engineered automobiles which are ahead of their time. Many of the concepts that put these automobiles ahead were pioneered by Mercedes-Benz over 20 years ago. They are still not found in any American sedan.

The 450SE has moved Mercedes-Benz even farther ahead. It has developed the basic systems of the automobile to greater heights than any other sedan in Mercedes-Benz history. Will the other manufacturers ever catch up? Read the following. Then decide for yourself.

Shape and size of the future

The 450SE looks as if it were designed in a wind tunnel, not a styling center. It was. Its aerodynamic design harnesses airflow instead of fighting it.

On the *outside*, the 450SE Sedan is not as big as a full-sized American car. The only thing big about this Mercedes-Benz is the amount of room *inside*. The 450SE is a five-passenger sedan with fully 20 cubic feet of trunk space. And its 25.4-gallon gas tank can give you about 400 miles of cruising range.



The engine of tomorrow

The engine in the 450SE is a sensible 276-cubic inch V-8. An overhead camshaft design featuring computerized, electronic fuel injection, this clean burning engine delivers good mileage without paying a performance penalty. An engine others will strive for tomorrow—available in the 450SE today.

The best handling Mercedes-Benz Sedan ever

It's almost unfair to compare a 450SE's handling with a domestic sedan's. Each wheel on a 450SE is suspended separately. So, unlike *all* domestic sedans which continue to have the same basic wagon-type rear axle they have had for decades, the suspension of a 450SE is fully independent.

Mercedes-Benz goes to great expense and effort to initiate new suspension developments. They can spell the difference between accident and incident. Ahead of their time? Unfortunately, for other sedan owners, years ahead. Owners of the 450SE, however, can call on these developments right now, and every time they take the wheel.

Safety first

The structure of the 450SE is the latest in a series of Mercedes-Benz developments of the patented rigid passenger cell/deformable extremity construction. It is designed so that the front and rear extremities absorb force in the event of an impact, to help the passenger cell remain intact.

One final thought. Today, when more than ever everyone is searching for lasting value, a Mercedes-Benz 450SE makes good sense. After all, an automobile which is years ahead of the rest today is far more likely to hold its value while the others are trying to catch up tomorrow.

Mercedes-Benz

Engineered like no other car in the world.

The people who service color TV say Zenith needs fewest repairs.

For the third straight year, a leading research organization asked TV service technicians from coast to coast which color TV needs fewest repairs.

Again, Zenith was named most often.

Zenith was also named as the color TV with the best picture, and as the one more service technicians would buy for themselves today.

Question:
In general, of the brands you are familiar with, which one would you say requires the fewest repairs?

Answers:

Zenith	**34%**
Brand A	15%
Brand B	11%
Brand C	7%
Brand D	4%
Brand E	3%
Other Brands	10%
About Equal	16%
Don't Know	9%

Note: Answers total over 100% due to multiple responses.
The Gainsborough, model F4754E. Simulated TV picture.

The people who own Zenith overwhelmingly choose Zenith again.

Again this year, a nationwide survey asked color TV owners if they'd buy the same brand today. Because nobody knows more about TV quality than someone who's lived with his set, year in and year out.

When the results were in, Zenith had won again.

Question:
If you were buying another color TV today, would you buy the same brand you bought before?

Answers:

Zenith	**82%**
Brand A	70%
Brand D	69%
Brand B	66%
Brand E	63%
Brand C	56%
Brand H	51%
Brand G	49%
Brand J	49%
Other Brands	44%

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For details of the owners' and service technicians' surveys, write to Zenith Radio Corp., 1900 N. Austin Ave., Chicago, IL 60639.